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A CORNER CLOSET FOR THE HALL.

BY MISS F. M. GARDINER.

A VERY fair estimate may generally be formed of the powers of administration of the mistress of a household by the first glance we obtain as soon as the front door is opened. And it will be readily granted that the hall of an ordinary middle-class house can be rarely considered

"A thing of beauty, and a joy for ever."

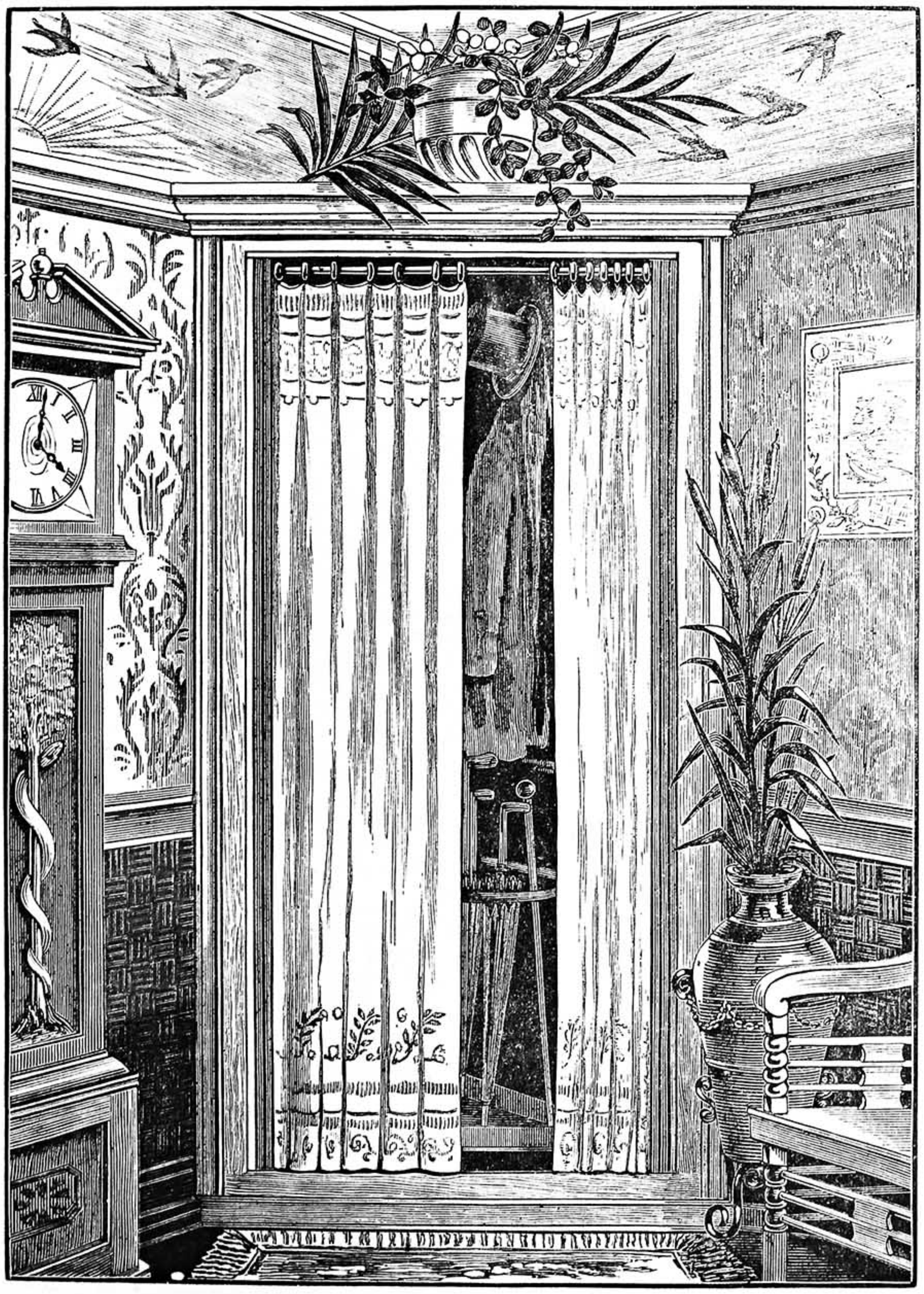
On the contrary, if the family is large, it often becomes a receptacle for the cast-off wearing apparel of its different members, and the repository for dripping umbrellas, tennis rackets, cricket bats, and various articles too numerous to mention, which might with advantage be transferred to a more suitable position.

To avoid the row of coats and hats, in a more or less dusty condition, as a rule found here, a small wardrobe, like the one illustrated, might be easily substituted, even in a hall of limited dimensions, for the pegs which one invariably finds there.

This might be placed in a corner, if the hall be large enough, or against a side wall, when it is not of sufficient size to admit of such a structure as I have suggested in the accompanying illustration. The framework and top could be made of any appropriate wood, or, where cost was a consideration, simply stained or painted to match the other fittings.

The interior should be liberally supplied with hooks and pegs, and the lower part with a rail and movable tray for umbrellas, also a small drawer for brushes, etc. These would be effectually hidden by curtains, attached to a brass pole by rings, yet, at the same time, be easily accessible. Such a piece of furniture would be welcome in any house, and is so simple in construction that it would be well within the power of even an amateur workman to execute.

From what has been said above, as well as from the illustration itself, it will doubtless be understood that the form of the closet must depend entirely on the size and shape of the hall, and that for the corner closet the hall must bear the semblance and proportions of a room of fair width, rather than those of the narrow passages that are too often misnamed by the application of this dignified title. Yet even in the passage itself, properly so called, it is often possible to introduce an arrangement of this kind, by affixing side frames of stained wood, with panels of cretonne stretched over thin board, or even millboard, on either side of the row of hat pegs and coat hooks to be found on the wall, covered in with boarding at the top and kept in position at the bottom by a slip of wood extending from frame to frame, and fixed to them at each end. A cornice should connect the frames at the top, and within the cornice should be a rod to carry the curtains that screen the hats and coats from view after the manner of the Portable Wardrobe, figured and described in page 150. Here is a rough outline for a useful article of house furniture, and it is assumed that those intending to make it will have a sufficient knowledge of carpentry to enable them to proceed without my giving step by step details. To those who are without this knowledge, a careful perusal of much that can be found in WORK concerning the elementary stages of carpentry will soon fit them for making this simple closet. For its decoration the enamels of the Foochoo Co., Aspinall, and others, will be invaluable.



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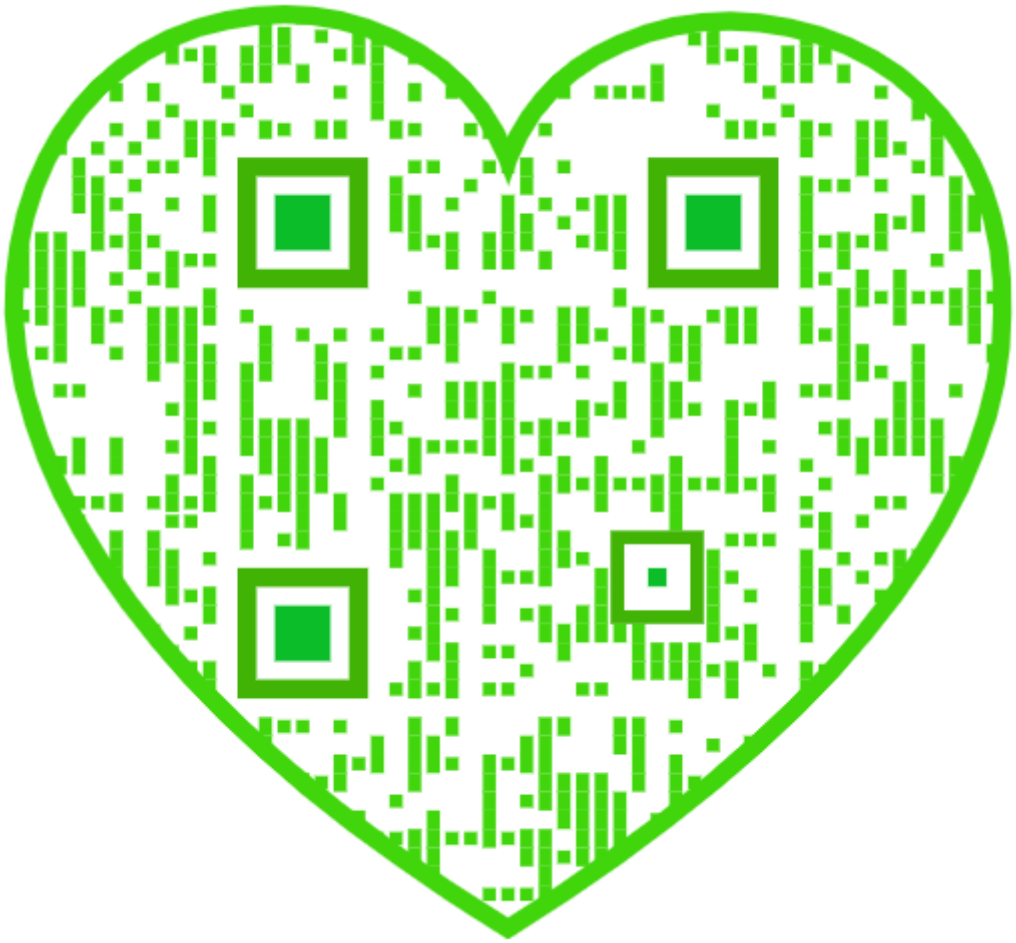


THE TAMBOURINE, AND HOW TO MAKE IT.

BY OMADAUN.

A PRETTY ARTICLE FOR DECORATION—ITS CONSTRUCTION—THE HOOP—CHEAP JINGLES TO BE AVOIDED—BRASS NAILS OF TWO KINDS—CHOOSING A VELLUM—HOW STRETCHED—UTILISING A CHEESE TUB FOR MAKING HOOP—SUGGESTION FOR DECORATION IN WATER COLOURS.

THIS is an article which of late years has soared high, and attained to an eminence for decorative purposes never dreamed of in its humbler days, when—so far, at all events, I believe, as this country is concerned—it was the almost exclusive monopoly of the black cork fraternity. Now, a good tambourine, well painted, is a really pretty object, but the so-called art tambourine supplied by the fancy shop is an abomination, not worth bestowing good work upon; whilst the genuine article is rather costly—at least, in proportion; and it is so easy of construction, that I hope a few hints upon the subject may not be considered out of place in these pages.

I will first deal with the tambourine proper, if I may so call it. It is evident that this must be stoutly made, or it will not hold together long, seeing the arduous duty that it has to perform; and, although I have made one from an old cheese tub, and used it too, I do not advise that material, except for one intended for ornament only, when it may be used if economy is a consideration; of which, more anon.

A good solid hoop of oak or ash, steamed and bent to a circle, ready for joining and finishing, can be bought at many instrument makers' for about one shilling, and it will be far better to buy one of these than to attempt to bend one from the straight piece, which is hardly practicable for an amateur to accomplish satisfactorily. Choose a hoop of as near a true circle as possible, and a convenient size will be 11 in. diameter and 2 in. deep. The two ends should be tapered, and overlap for about 4 in.; they are then glued, and firmly cramped together. When set, this joint is smoothed off with plane and rasp, and the hoop nicely finished with sandpaper; the joint should then be hardly perceptible. The top edge may now be slightly rounded, and six slots cut at equal distances for the jingles; this is easily done with a fret saw, or they can be drilled out and finished with a file; they should not be cut quite in the centre of the hoop, but a little nearer to the bottom edge. With regard to the jingles, avoid cheap ones; the cost of the best is so little, a few pence only per pair, and the look of the tambourine is so materially enhanced by them, that they are well worth the trifling extra outlay. For my own part, I like an ebonised hoop, and plated jingles, but this perhaps is a matter of taste; if preferred, the hoop can be either stained or left its natural colour, and polished. Mark a line round the top, about $\frac{1}{4}$ in. from the edge, and drill a row of holes all round, about 1 in. apart: these are for the nails to be pushed through when stretching the vellum. There are two sorts of these nails to be had—some with brass heads and iron shanks, about the thickness of a panel pin, the others being entirely of brass; the former are better finished, but the latter sort are easier to clench, and are the ones generally used.

In purchasing a vellum, choose a good stout one, which is of an even thickness throughout; it should be about 3 in. wider in diameter than the hoop, to allow for turning over and finishing. Place it in a basin of water for a minute or two, not more; then take out, and allow the superfluous water to drain off. Pierce a hole in it with a stout needle or awl, about 1 in. from the edge, push one of the nails through, and then through one of the holes in the hoop, and clench it on the inside; pull the vellum tightly across, and put in a nail on the other side; now put one in on each side again, between the first two, and proceed in the same way until all the nails are inserted. The vellum must be stretched well before each nail is put in, and perhaps the easiest way to do this is to pull it with a pair of pincers. If the holes have not been drilled too large, and the nails fit tightly, it will not be necessary to clench each one as it is put in, but they will hold quite well by being simply pushed through, and can be clenched when they have all been inserted. Cut away the superfluous vellum to an even margin with a sharp-pointed pocket-knife, and when dry, it should be as tight as a board, making as good a tambourine as you can wish for. I need hardly say that the jingles are fixed by a wire or pin running through them. If, however, one is wanted for ornament only, there is no need to make it of quite such solid materials; and here, if, as I have said before, economy is a desideratum, a cheese tub may be utilised. The grocer will supply one probably for the asking: it must not be too thin, or it is likely to buckle and come out of shape when stretching the vellum, so choose as stout an one as you can get; there will be no difficulty in forming a circle of the required size from this material. The vellum, also, need not be so stout as our former one, and if the whole is to be painted over, an old parchment deed may be used if there is one side not written upon, which I need hardly say must be uppermost; but a clear vellum will look better if it is intended to let it show as a background for the painting. Put in six pairs of jingles, good ones, the same as before; they go a very long way towards giving a genuine look to the tambourine. The hoop can be either painted black or in colours, or left natural, according to taste. If a cheese tub has been the material used, it will probably look best painted, and as this wood is likely to be rough and coarse in the grain, it may have to be filled in with plaster of Paris, mixed with water to the consistency of thick cream; rub this in with a rag, and when dry, clean off with sandpaper. This tambourine will have to be painted upon in oils, but I would suggest that instead of a vellum being used, a piece of good paper—such as "Whatman's"—could be substituted, upon which a water-colour drawing could be executed. I have not myself tried this plan, but I think there would be no difficulty in stretching the paper on when damp, and perhaps a little glue round the edge would be advisable, the nails, of course, being used, but chiefly for ornament.

This would not perhaps be so durable as the usual style, but it would at all events be a variety, which has a certain amount of charm in itself always, and a little water-colour sketch can be so easily and quickly executed that it would not be a matter of great difficulty to renew the painting. The nails should not, in this case, be clenched, so that they could easily be withdrawn, and a fresh piece of paper stretched when required.

Although I have used a tambourine made out of a cheese tub and stout drawing paper, as I have said, it must be borne in mind that this form of the instrument, though serviceable enough for decorative display, is by no means so useful for musical purposes as one made of vellum.

THE VIOLIN: HOW TO MAKE IT.

BY J. W. BRIGGS.

PURFLING—CARVING-BLOCK—MODELLING—GROOVING FOR PURFLING—PURFLING WAISTS—MITRES IN PURFLING—SCRAPING AND SANDPAPERING—RIBS—REMOVAL OF RIBS FROM INSIDE TO OUTSIDE MODEL—WAISTS—HOLLOWING BACK—SANDPAPERING BACK, ETC.—CUTTING SOUND-HOLES IN BELLY—HOLLOWING BELLY—FITTING BASS-BAR—ROUNDING TOP, ETC.—GLUING RIBS TO BACK—GLUING ON BELLY.

Purfling.—Having got thus far, we may now turn our attention to the ornamentation of the instrument, known as "purfling."

Carving-Block.—A carving-block is now required, and as they are inexpensive and you can get on so much better, you had better make two. Get two pieces of deal 15 in. by 9 in. by 1 in. or $1\frac{1}{2}$ in., plane one side of each piece true, and mark the outline of the ribs on each planed side, and have the shapes cut out by a band saw. In both rough sides bore a small hole central of length and width, and "tap" or make a thread in it with the point of the carver's screw, using the square hole in the wing nut as a wrench. The back and belly should each be glued on one of these carving-blocks, by putting a dab of glue about 3 in. from each end, and cramping them to the blocks with iron cramps or with hand-screws. In a few hours these will be set, and you can proceed with the rough modelling and purfling.

Modelling.—Turn the carving screw firmly into the block on which the back is glued, put the screw through the bench, and turn the nut up to the under side of the bench. It is better to work the back first, as it will be first required. Now with smooth plane, *across the grain*, give the arching, roughly, of Fig. 9. Afterwards, with No. 4 gouge take off the thick parts of the wood, and aim to give a curve from the $\frac{3}{8}$ in. line to the centre joint.

Grooving for Purfling.—The purfling tool must now be set with one blade $\frac{5}{32}$ in. from the brass roller, and the other exactly $\frac{1}{16}$ in. further away, and screw it firmly up. A double line must now be traced all round, distinct, but not too deep; the lines must then be cut deeper with one of the fine, keen-pointed knives (B, Fig. 5, p. 85), always cutting off the end of the grain. The grooves should be cut to a depth of $\frac{1}{12}$th of an inch, which is the depth the purfling should be.

Purfling Waists.—The piece of wood between the lines in the *waists only* should now be taken out with a router (C, Fig. 5), the greatest care being taken neither to go through or split any pieces from the edge of the groove. The dark line in Fig. 11 is intended to represent the way in which the groove should be cut when ready to receive the purfling. A piece of purfling should be cut to completely fill this groove; when fitted, run glue all through the groove, and tap the purfling into its place with a small hammer. With a sponge dipped in hot water remove the glue, and rub the purfling more perfectly down with the tail end of the hammer. When both waists are purfled, lay the back aside to dry, and proceed in like manner with the belly. It will be remembered that the "tab" prevented the gauge from going completely round the back. The lines must therefore be joined with the compasses, care being taken to preserve the sweep or curve.

Mitres in Purfling.—The entire grooves will now be ready for cutting, and the utmost care will be necessary in making

the mitres at each corner, as also the joints in the pieces of purfling. The purfling already in the waists will require to be cut down in the direction shown by line *a a* (Fig. 11). Your next business is to make the mitres on the pieces of purfling, which must be done so well that the points of both inner and outer blacks as well as the whites finish together at a very acute angle. It is said that in the Cremonese purfling, the outer black is run a little beyond the meeting point; the delicacy of this apparently trifling process will be best appreciated by those who try to do it. After all the mitres are fitted to their places, make bevels at the other end of each piece in such a manner that when glued in no joint will be perceptible. I find it more convenient to put the upper and lower rounds of purfling in, each in two pieces, as the mitres can be made much safer and better than when only one length is used. When purfling the belly, do not attempt to make joints at either top or bottom; the insertion of the neck in one case, and of the bottom nut in the other, will obviate all necessity for doing so. When all the purfling is laid and rubbed down, sponge the edges all over with hot water; this will not only take off all glue from the surface, but will make the purfling fit better. Now put aside to dry while purfling the belly, which being accomplished, take the back in hand again. Open the compasses to $\frac{5}{16}$th of an inch, and trace a line round the back that distance from the edge. Fix the screw through the bench as before, and, following direction of arrows in Fig. 2 (p. 5), with No. 6 gouge cut a hollow between the compass line and outer edge of purfling all round, leaving the corners B, B, until last. If by mischance you happen to make the edge of the hollow irregular, go round again with the gouge, this time a little over the purfling, and cut in opposite direction to the arrows. When the hollow is satisfactorily carved, complete the lengthways arching (Fig. 9) with flat gouge and oval plane. Then give (at A, Fig. 9) the requisite form across the waist with No. 4 gouge; after having done this, with gouge No. 2 and small planes gradually "melt" the archings into the hollow all round, taking care that the hollow be not damaged; if your wood cuts rough, reverse your cutting. Never attempt to carve the wrong way of the wood.

Scraping and Sandpapering.—With the scrapers, very sharp, take out all plane marks, and with sandpaper No. 1½, used on cork rubbers, sandpaper all over, but do not spoil the modelling in doing this. Brush off all the dust, and sponge all over with cold water; and whilst the back is drying, model the belly in the way described. By the time this is finished the back will be ready for another scraping and sandpapering—this time with finer paper. Should any inequalities be shown up by the wetting, these must be adjusted with the scrapers before papering. After this operation is performed, again sponge the work over, as ultimately by doing so you will obtain greater solidity, and less liability of the grain rising when the varnish is laid on. The belly should now be attended to in the same way.

Ribs.—The next step will be the manipulation of the ribs and their attachment to back and belly.

Removal of Ribs from Inside to Outside Model.—The ribs should now be taken off the model by inserting a knife between each block and the model, and giving the knife a tap with the hammer. In this way break the glue which holds the blocks and the model together. When all are loose, gradually ("*poco a poco*," as a fiddler would say) press the blocks in turn out of the model, but mind not to loose any of the ribs in doing so. The ribs should at once be placed in the outside model or frame, and have the linings put in them. Take the lining strips and file one edge to a nice round or bevel, whichever you fancy is the prettier, and cut them to fit in between the blocks; make each end which touches either top or bottom blocks a little wedge-shaped, so that when glued and pressed into position they will fit tight; leave them a little "proud" of the ribs.

Waists.—When all the eight upper and lower bout linings are in place, sponge all glue off, and attend to the waists. Of course, the linings of these will require to be bent in the opposite direction to those already put in, and may be run into or only just made to fit between the blocks 2 and 3, 5 and 6. If you adopt the latter method, the ribs should, when all linings are fitted, be drawn a ¼ of an inch out of the model, and the linings fastened at each end until set with a cramp (P, Fig. 5). When these are set, press the ribs through the other side of the model, and fix the other two linings. Another way to fix waist linings is to make blocks to fit all over the linings of each waist, and cramp them to the model. Still another way, is to cut a groove in each block with a $\frac{1}{16}$ in. chisel, and run the linings into these grooves. You may use your own discretion as to which method you select. When dry, plane the linings level with the ribs, reduce the top block to ¾ of an inch, the bottom one to ⅝ths, and round the corners off with No. 3 or No. 4 gouge. Next with flat gouge carve remaining blocks level with the linings, giving the inside the guitar shape, and sandpaper all round the insides, using a rubber, to prevent the sharp corners of the gluing edge of the linings being taken off. A great deal of taste may be displayed in lining and in carving the blocks. I have put linings in and carved the blocks in a variety of ways, some of which make the inside of the ribs look very pretty, but these are only "fads," and "utility" is the order of the day.

Hollowing Back.—Now give the back a final sandpapering, and then take it off the carving-block by forcing a knife between them from each end; you may now mark the back from inside the ribs. With fiddle cramps fasten the ribs into the position originally traced from the outsides, and mark round the insides with thick lead-pencil; now remove the ribs and replace them in the frame. This done, cut two pieces of deal 5½ in. long by 1 in. by 1¼ in., and glue on them the three pieces of wood, ⅛ in. thick, marked at A, A, A (Fig. 13). Instead of gluing these pieces on, the blocks may be recessed ⅛th of an inch, but the first way is simpler. As soon as your hollowing blocks are ready, lay them on the bench, put the back upon them in the position obviously laid out for it, and through a hole in the bench at each end pass one of the iron cramps, and with a protecting piece of wood, about 2 in. long, on the back, and under each cramp, screw the latter up tight. Next put pieces of cork, 3 in. long, 1 in. wide, and depth to fit under and across each corner; also a small piece under the joint midway of its length. Do not put these pieces in too tight, just sufficiently so to make the back solid. With No. 4 gouge now carefully proceed to hollow, working very steadily, and cutting from inside the pencil mark to the joint. Take only small cuts, constantly trying the thicknesses with the gauge until you have half the back hollowed to $\frac{1}{32}$ in. more than those given in Fig. 14. This is to allow for toothing, scraping, and papering. One side being roughly hollowed, turn the back round, and work the other half in the same way. The thicknesses given in Figs. 14 and 15 are not, of course, absolute; the varying qualities of wood will necessitate slight modifications. The gouging being finished, with tooth plane reduce to a *shade* above the proper thickness, at which you must arrive with the scrapers. *Do not be afraid of using the gauge too frequently.*

Sandpapering Back, etc.—After scraping and finally adjusting the thickness, sandpaper all the inside to a good face. The edges may now be rounded. This is done with a round side of a rather fine file, taking off the square edges, and making the entire projection from purfling to rib-line a beautiful roll. Then paper up without destroying the roundness of the edge, wrap it up, and put it out of the way. Do not attempt to do anything with the tab yet.

Cutting Sound-Holes in Belly.—The belly, still on the carving-block, will now require fine sandpapering, and the sound-holes to be marked on it. Place the pattern (Fig. 16) parallel with the joint (which will, if all has been carried out as described, be exactly central), with its centre mark, A, 6¼ in. from the bottom of centre joint. Then with a very fine pencil, and with the greatest care, trace inside the pattern. Now reverse the pattern in exactly corresponding position, and mark in the same manner. The circular holes must now be cut out with punches or centre-bits. With the first-named the position is easily determined: press the punch, and at the same time give a circular motion to it. Cut a clean hole—if right through, so much the better; but if you use the centre-bit, take care that you are absolutely central, and do not lay on too hard, or points B, B, will be *shaken* and afterwards *taken* off. You may now follow the pencil line with a knife, cutting in the direction of the arrows. The straight lines, C, C, must be cut from the points. Sound-holes may also be cut out with a fret saw.

Hollowing Belly.—The belly should now be taken off the carving-block and hollowed in the way described for the back, or nearly so, as, being different wood, it will require a little different treatment. When you have finished the hollowing, scraping, and papering, the sound-holes may be trimmed with the knife and small files, and the V's cut.

Fitting Bass-Bar.—The bass-bar should next be fitted as follows: first plane it down to $\frac{3}{16}$ in., and cut it square off at 10½ in. Now make a pencil line parallel with the joint, but $\frac{9}{16}$ in. distant from it, down the right-hand side, and 1¾ in. from both top and bottom outside edges; make ½ in. marks at right angles with the pencil mark. The position of the bar is now fully marked out. With the flat gouge roughly fit the bar to its place, keeping it perfectly upright. Chalk the bar position well over with a piece of chalk similar to that used for billiard cues, as it is more free from grit than common chalk, and putting the bar close outside the pencil mark, draw it slightly backwards and forwards, pressing gently downwards all the time. With flat oval plane carefully take off the chalk marks which appear on the bar, and repeat the process until the chalk shows all over the fitting edge of the bar, when it

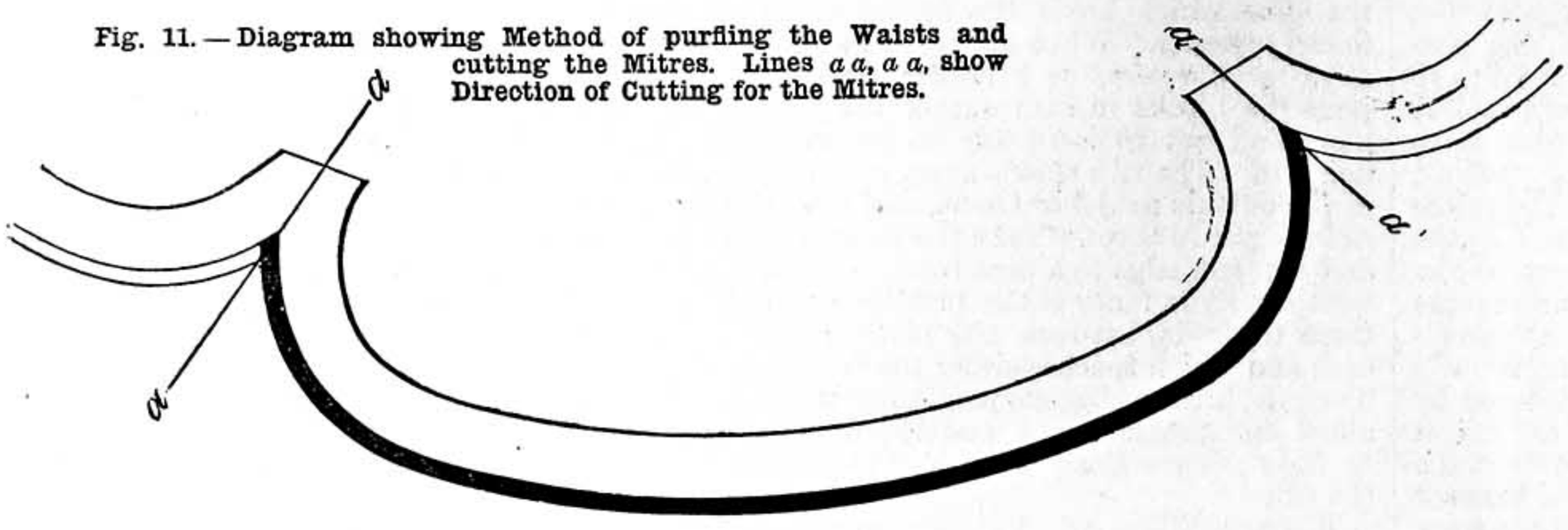


Fig. 11.—Diagram showing Method of purfling the Waists and cutting the Mitres. Lines *a a*, *a a*, show Direction of Cutting for the Mitres.

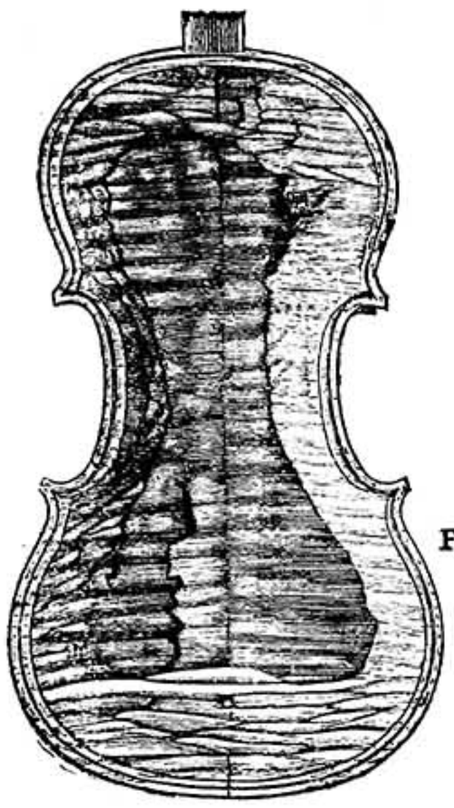


Fig. 8.—Back with Edge reduced ready for Purfling.

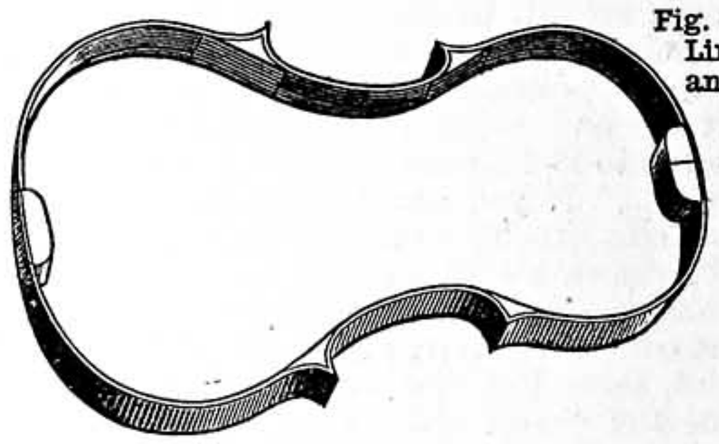


Fig. 12.—Set of Ribs with Linings in; Blocks carved and finished.

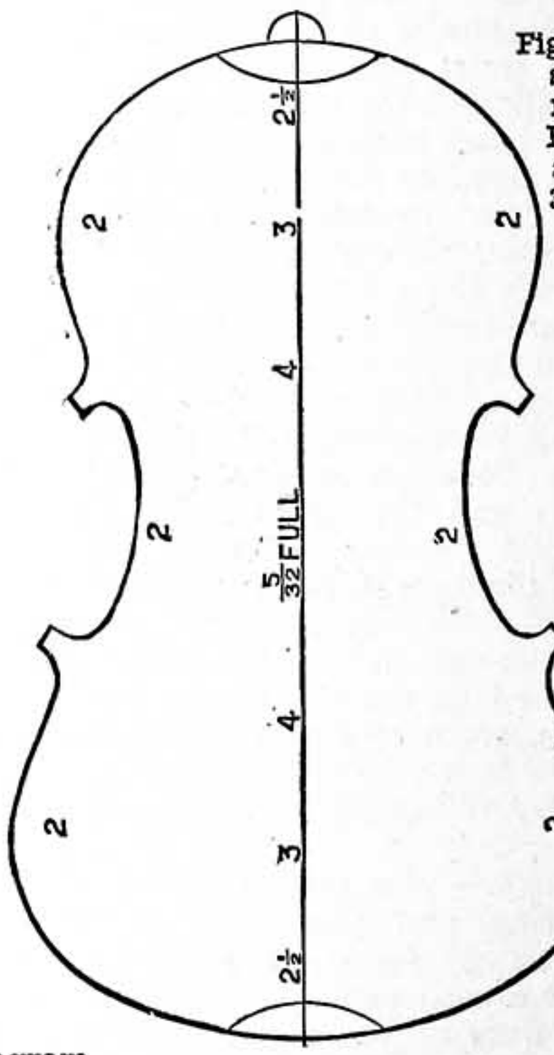


Fig. 14.—Diagram showing Thickness of Back. Figures in Figs. 14 and 15 refer to 32nds of an inch.

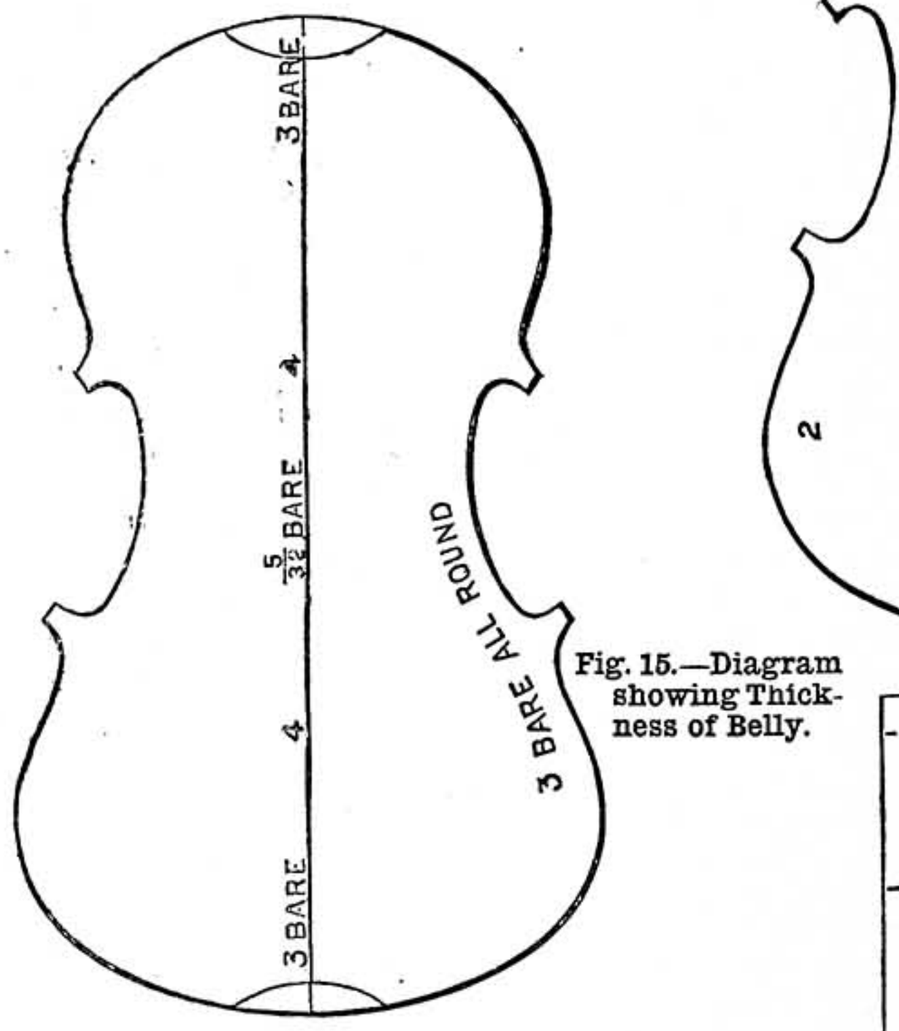


Fig. 15.—Diagram showing Thickness of Belly.

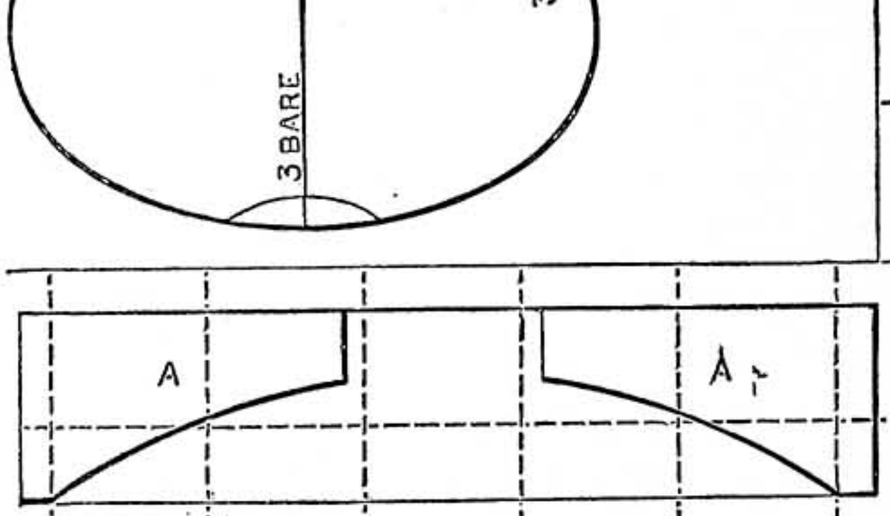


Fig. 13.—Blocks for Hollowing (half size).

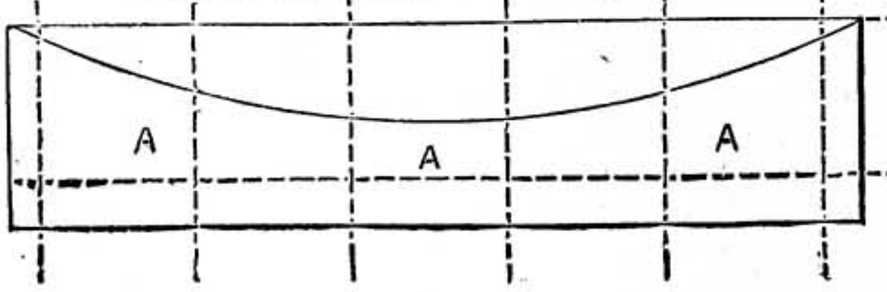


Fig. 10.—Pattern for Arching across Waist at A (half size).

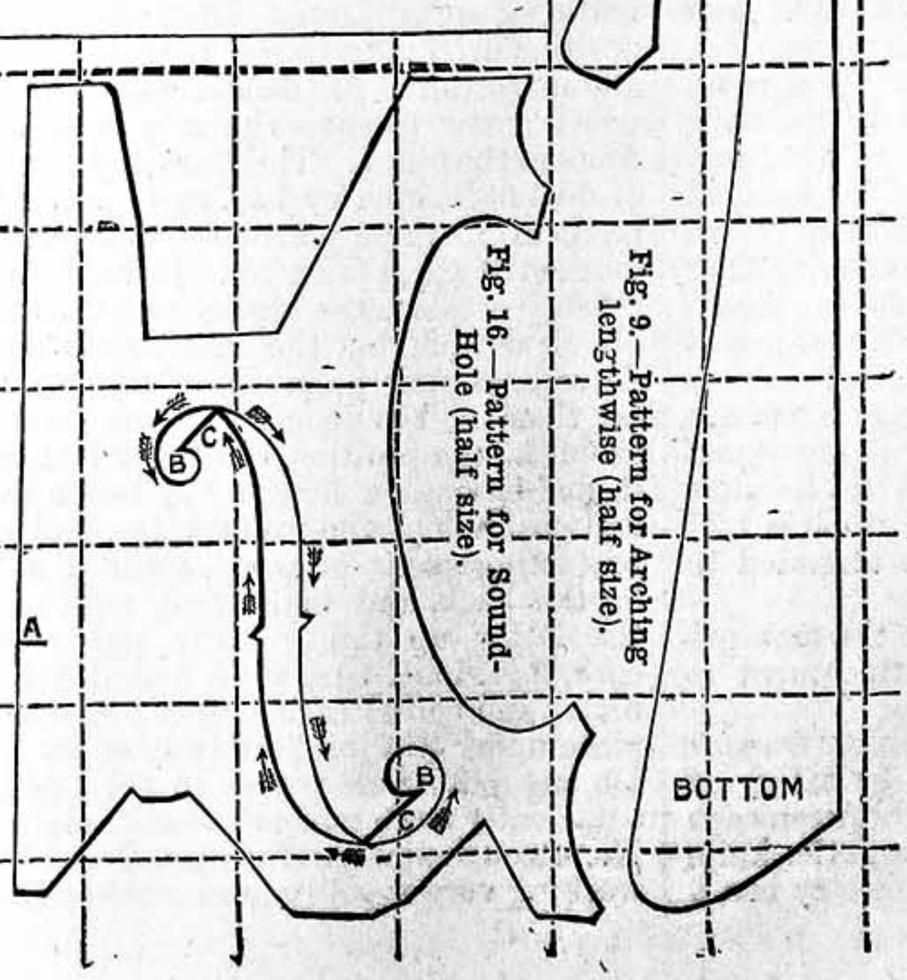


Fig. 16.—Pattern for Sound-Hole (half size).

Fig. 9.—Pattern for Arching lengthwise (half size).

BOTTOM

will be ready to be glued in. This may take you a few minutes or it may take a long while, but it must be done properly. Now remove all the chalk with a dust-brush, glue the bar, and cramp it in position with the bass-bar cramps (H, Fig. 5). A little fine sawdust should be thrown along the angles formed by the bar and the belly, then with a narrow chisel remove both sawdust and the glue which it will have taken up. When the bar is quite set, plane it down to the right size $\frac{3}{8}$ in. deep at the point where a line between the two inner V's of the sound-holes would cross it, and gradually diminish with a slight curve to $\frac{1}{16}$ in. at each end.

Rounding Top, etc.—With rough sandpaper, followed by fine, the top should next be made round.

The edges of the belly should now be made round in the manner described for the back. The sound-holes, when finished, will be rather larger than the pattern, as they have been traced inside a zinc pattern, and it is intended that all the lines should be cut away.

Gluing Ribs to Back.—Before fixing the ribs to the back, the blocks should be sized by giving them a good coat of glue, then burning the glue with a hot iron, afterwards rasping off the burnt glue. This effectually stops the blocks from absorbing any more glue. A coat of very thin glue on the rib edges is also beneficial. The ribs may now be glued, placed on the back to the position marked from the outsides, and the end blocks be cramped down with iron cramps, having a piece of wood between cramp and back, to prevent the latter being marked, and also to extend the pressure over the blocks; use the violin cramps all round, and when all are secure, sponge all the glue from inside.

Gluing on Belly.—In a few hours you may clean the inside with fine sandpaper, affix your label, and glue the belly on; if any glue should run down the inside, sponge it out directly, as you will not have another chance, but be quick, or the glue will be cold. When the belly is set, remove the cramps, and cut the recess for the bottom nut or rest, over which the tail-band or main-brace passes. With the dividers opened to $\frac{5}{8}$ in., make

a dot close inside the purfling at each side of the centre-joint, and with a knife and small straight-edge cut out the oblong piece of the belly thus described, and fit a piece of ebony $\frac{5}{16}$ in. square into the recess. When set, curve and file the ebony to the same sweep as the belly round it, and at $\frac{1}{4}$ in. from each end curve it down to the belly. The "box" is now made, and begins to look like a fiddle. In my next and last paper on this subject, I shall endeavour to show how the fiddle is finished and strung up.

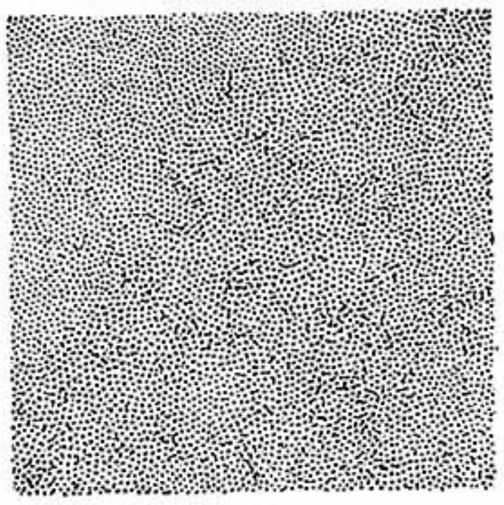


Fig. 2.

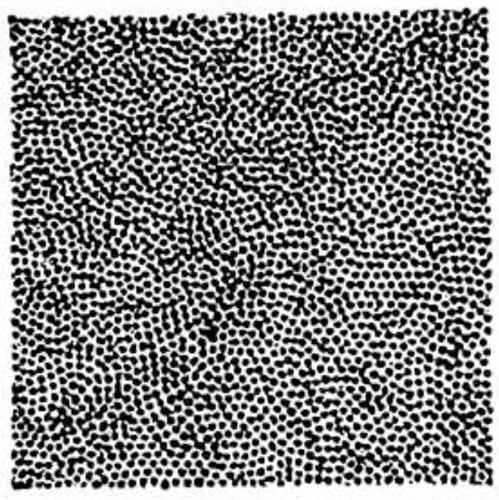


Fig. 3.

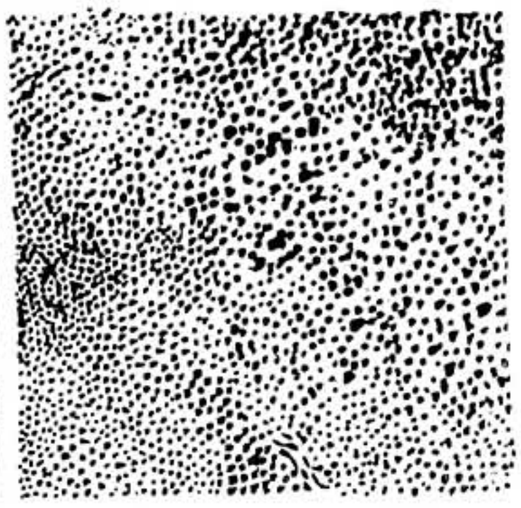


Fig. 6.

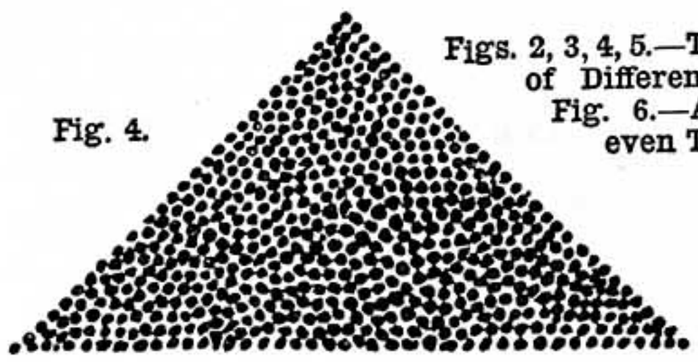


Fig. 4.

Figs. 2, 3, 4, 5.—Tints of Dots of Different Sizes. Fig. 6.—An Uneven Tint.

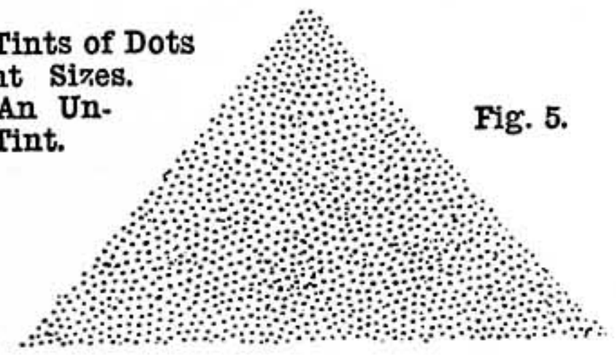


Fig. 5.

prevent it touching the drawing to the detriment of the work, and also gum a piece of white paper along the bottom edge, large enough to cover it, and if this be turned back at the top gradually as required, the stone will be kept covered and free from dust, etc., during the progress of the work.

The hand-rest should consist of a piece of wood about $\frac{1}{4}$ in. thick, 4 or 5 in. wide, and about 2 ft. long, having bevelled edges. A pad is sometimes used in place of it, and can be made of a couple of sheets of brown paper covered with a clean piece of white paper, and on which the pens and chalk can be tried.

Now rule three or four spaces, about 1 or $1\frac{1}{2}$ in. square, with a lead pencil, at the top left-hand corner of the stone, and in the first make an even tint of dots, of any size as long as they are uniform. The student must remember not to work over the blacklead line, or it may prevent fine dots penetrating to the stone, and a white line be the result when printed, especially if a soft lead pencil be used.

Figs. 2, 3, 4, and 5 give examples of different size dots, which it would be as well that the student should copy and get perfect before proceeding any further. He will, perhaps, find that until he obtains full control over the pen, sometimes, against his will, a dot will be made larger than he intended. In such a case leave it until the whole tint is finished, and then cut it in halves by means of the steel pointer, or else place the pointer in the centre of the dot, and by giving it a sudden twist round a slight hole will be made in the stone.

In taking out lines or dots, the stone must be scratched, it not being sufficient only to remove the ink; for, although not perceptible, it may still roll up in printing. The ink having once touched the stone, adheres so strongly to it that it cannot be removed without scraping away some of the stone at the same time, and although the part thus scraped will appear white in comparison to the surrounding stone, it does not affect the work when printed.

To draw tints like Figs. 2, 3, 4, and 5, make a dot, and use it as the centre of a star, then make about five dots round it, and so continually make it larger by placing each successive dot exactly between two other dots, and exactly the same distance apart. Thus, if the dots are of uniform size, the tint will be perfectly even; if too much space appears in any portion of the tint between the dots, it

ARTISTIC LITHOGRAPHY.

BY MISS ADA J. ABRAHAM.

TECHNICAL WORK: STIPPLES.

FIRST EFFORTS—STONE FOR STIPPLING—POSITION OF STONE—REST FOR HAND-BOARD—HAND-REST DOTS—TAKING OUT DOTS—DRAWING TINT—TINTS IN STARS—FLAT TINTS IN LINES—PLATES OF TINTS.

PRESUMING the student already to have a knowledge of drawing, shading, and colour, he should commence by practising the technical part of lithography, after which we will take him through the different stages, beginning with a simple circular consisting of just a little writing, and proceeding until a finished chromo-lithograph in half a dozen printings is obtained.

Although precisely the same treatment of work is required technically in drawing on stone, whether the subject to be drawn is in colour (chromo-lithography), or merely in black and white (lithography); still, it would be better that the student should keep to black and white in its simplest form, at any rate, until he has mastered the first principles of the art.

There are two ways of working lithographic drawings, namely, stipple and chalk work respectively.

In order to practise stipple work the novice should have a clean polished stone about 12 in. by 20 in., that being a good size for practising, and also a block of wood about 6 in. high, 4 in. wide, and 2 feet long, on which to rest the stone, and so tilt it for convenience in working. (Fig. 1.)

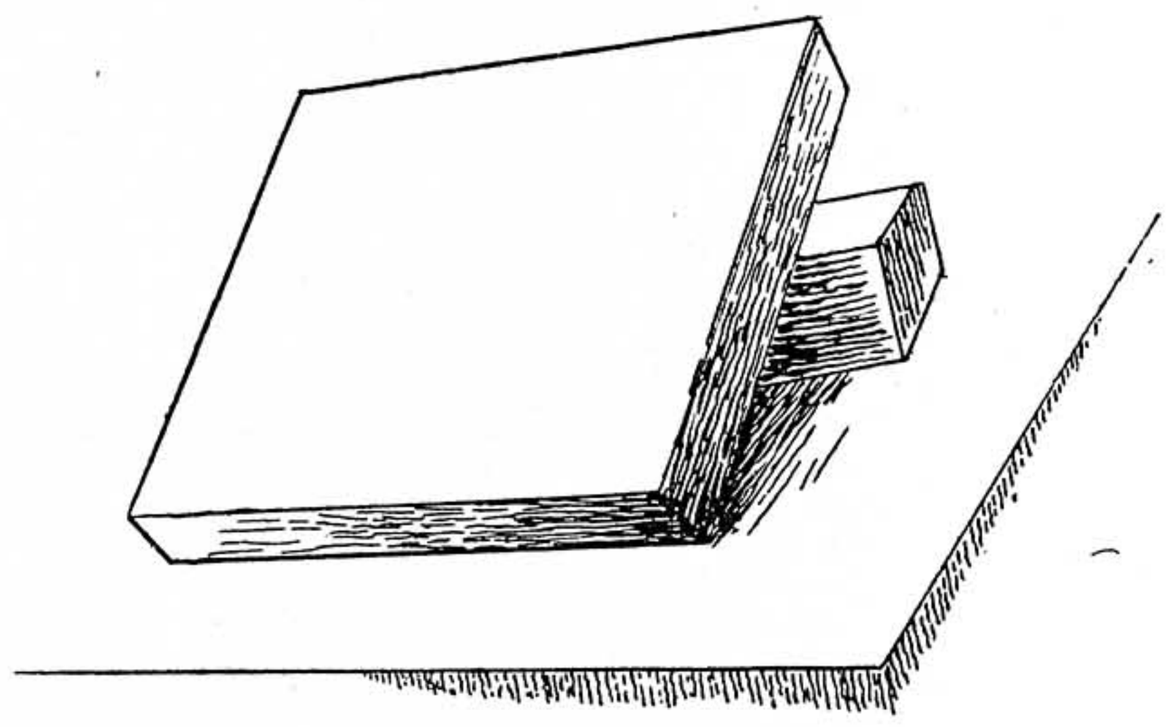


Fig. 1.—Position of Stone on Block and Table.

For some work, such as ruling lines, drawing curves, etc., the stone would be better flat, and if a thick pad, made of brown paper, is placed underneath, about the centre of the stone, the artist will find he can turn a comparatively large one in any direction he pleases; but for a drawing he will find the above much more convenient, especially in reaching to the top of big stones, in which case a narrow piece of wood, nailed to the edge of the bench, would prevent the stone from slipping. For very large work, such as posters, etc., there are proper fixtures made, but in these cases the work is necessarily done at the printer's, it being impossible to move such huge stones about with convenience.

Gum a strip of mill-board about $\frac{1}{4}$ in. wide down the left and right edges of the stone, on which to rest the hand-board, and

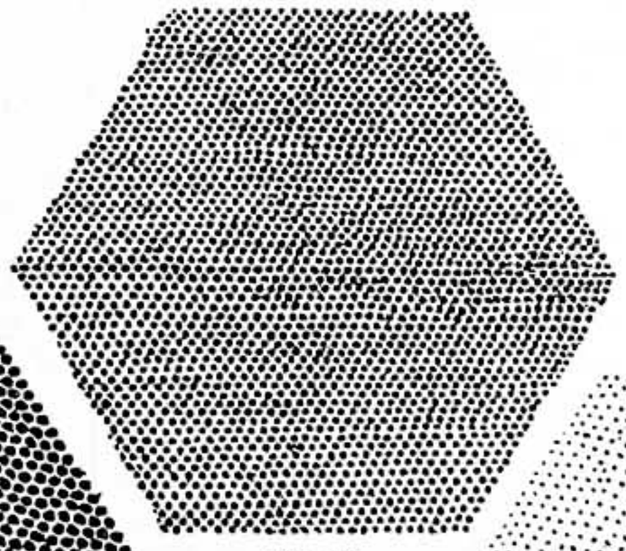


Fig. 7.

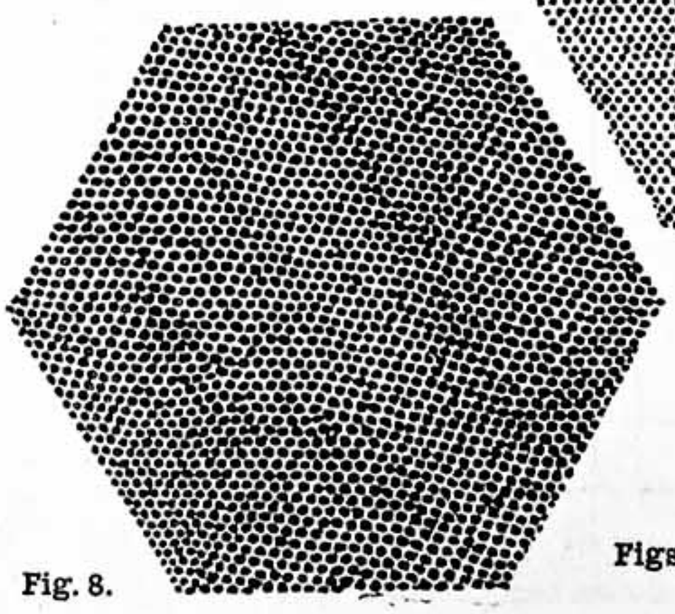


Fig. 8.

Figs. 7, 8, 9.—Tints in Dotted Line.

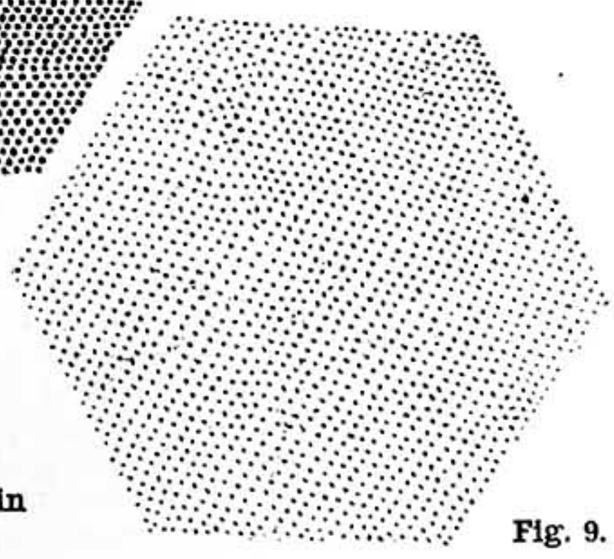


Fig. 9.

may be rectified by filling it with finer dots placed between the others, which would not materially affect the tint when finished, if carefully executed.

At starting, the novice will find that the dots, instead of appearing round, will look like triangles; this is because the pen has been dragged unconsciously along the stone, and perhaps only worked on one nib. The pen should be worked on both nibs and held nearly upright, so as to work on the point; it must be placed firmly on the stone, and lifted from it in exactly the same place. The longer the pen is allowed to remain on the stone the larger the dots will become. Fig. 6 is a specimen of uneven tinting and bad dots.

Unless the pen is cleaned frequently the ink will dry in it and get clogged, the substance of it being so much thicker than the ordinary writing fluid.

It is necessary to make a perfectly black dot on the stone, or the acid will eat through the ink quicker in those parts where it is weak.

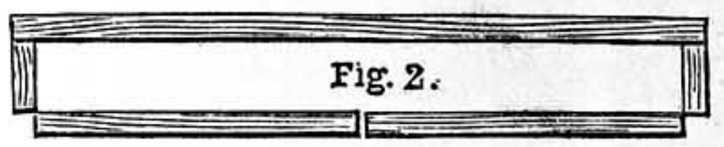
Figs. 2 to 6 are examples of working different tints in stars, and Figs. 7, 8, and 9 show specimens of tinting where the dots are worked in lines. The student will soon observe by experience how closely one line should be placed to another, and the various sizes the dots should be made for different kinds of work.

In making a flat tint in dotted lines, the same as in stars, the dots must be placed between, and not underneath, each other to obtain an even tint, which at present is the student's ambition, and he should well understand that it is better not to depend on rectifying any mistakes in his work by means of scratching with the needle, or filling in with dots, as he would be likely to get into a careless way of working, and be very disappointed when his work was printed. If the tint is not progressing satisfactorily, the student must not get out of patience with his work, as that would only make matters worse, but try another pen or clean the one in hand, see that the ink has not got too thick, rule another square, and try again; and if he takes to heart that the cleaner the stone is kept, the blacker the ink is, and the rounder, firmer, and more uniform the dots are, the more even his tint will be, the clearer it will print, and the more satisfactory his work will eventually turn out.

Of course, there are times when it is not necessary to be so particular over a tint, but if the artist can do the best and finest work he can easily do the other; but on the other hand, if only able to do the common class of work, he will find himself at a great loss when wishing to undertake a better style.

Steel plates are made consisting of dots, lines, curved lines, curved dotted lines, etc., etc., which can be transferred to stone by gumming over the parts not required for the tint, and then placing a transfer from the plate upon it, the gum preserving the stone where no tinting is required. This saves the artist a great deal of trouble in large, flat tinting, but is principally used for colour work.

Having now become familiar with the use of the pen and gained full control over the same, the student should next attempt a shaded tint by means of dots of various sizes



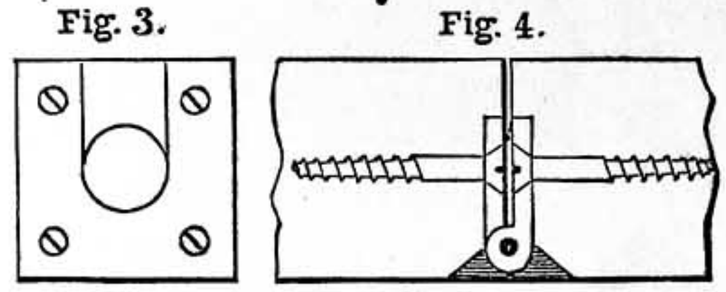


Fig. 1.—Mode of fixing Side Slips to Back. Fig. 2.—Mode of attaching Sides to Side Slips. Fig. 3.—Plate on Inner Upper Corners of Sides to carry Rod. Fig. 4.—Method of hingeing Side to Side Slip.

A PORTABLE FOLDING WARDROBE.

BY B. A. BAXTER.

A Receptacle for Clothes — Light Framed Back—Framed Ends Hinged to the Back —Top to Fall over the Folded Ends when Closed, to Rest upon Ends when in Use—Preparation for a Curtain to form Front.

There may be many readers of Work who are longing to use their newly-found skill, and to make some article of utility. The difficulty is, often, in deciding what is within their capability. They would like to make the very excellent and ingenious combination bedroom suite by Mr. James Scott, in Vol. I., pp. 401-2, but that is, without doubt, a difficult task for an amateur. I recently made a portable receptacle for ladies' dresses, etc., for a customer, who suggested the plan, which, having somewhat improved, I submit to the notice of my fellow-readers. This portable wardrobe is shown complete and open in Fig. 5. The top is a piece of 1 in. deal, about 3 ft. 6 in. long and about 20 in. wide, but any suitable dimensions may be adopted, providing only the length is somewhat in excess of twice the breadth, for reasons which I will explain presently.

The back is a frame halved or mortised and tenoned together, about 2 in. narrower than the length of top. The stuff of which it is made may be 3 in. by 1 in. The height is variable, and depends on the length of the garments it is desired to put into the wardrobe; 5 ft. 3 in. or so would do, but in this also be guided by any lady who has a right to advise in the matter.

Having, then, a frame for the back of the dimensions deemed suitable, pieces of 1 in. wood should be fixed on to the face of the frame at the edges, as in Fig. 1, which is shown in plan.

This is to give room for the hooks. The ends are similarly constructed, and should be each alike, one-half of the width of the back frame in width, and the same height. These ends are hinged on to the pieces fixed on the back, so that the whole will close, as shown in Fig. 2; and when some brass hooks are affixed to rails screwed on to both back and ends, there will be room, with care, for the hooks, without any coming into collision. It would greatly assist in avoiding this if the hooks at the back were fixed at a different height to those on the ends.

Having made the three frames, and hinged them together, the top—a piece of 1 in. deal—should be hinged to a piece fixed on to the two pieces which serve to hinge the sides. If the maker chooses, preparation could be made for a more workmanlike and strong fixture by mortise or dovetail; of course, this would involve cutting the hingeing styles a trifle longer. It is necessary to observe that the width of the top hingeing piece is such that the piece which forms the top can fall down freely in front of the closed ends. A ledge fixed on under side of top at ends would form a suitable stop, and a rod cut to the length of the space between ends when open would keep the whole thing open to the proper distance.

This rod can be supported by two pieces of 1 in. hard wood, having a centre-bit hole of the proper size. One of the pieces must have the hole cut into, as in Fig. 3. On the rod a curtain can be hung; the back and end frames may be covered with a suitable cretonne, or covered with canvas and wall-paper to match the room in which it is to stand.

I ought to say that either "butts" or "back flaps" will do for the ends; for the top, however, the hinges should be let in so that the hinge does not project at all, for that would be in the way of the ends. Probably the best way is to use butts, as in Fig. 4. The part blacked must be planed off to the proper depth before fixing the hinges.

I can only hope that I have explained this simple construction with sufficient clearness, and that all who attempt may be successful. It will, I believe, keep the clothes from much dust, and will relieve the pressure upon the hooks of bedroom doors, where clothes hanging are in the way, and are both inconvenient and unsightly. Moreover, the weight thus thrown on the upper part of the door tends to exert a strain on the topmost hinge, which is undesirable. It may be added that as the wardrobe is both folding and portable, it could be taken to the seaside by visitors for any lengthened period to supply the want that is often felt in lodging-houses of a receptacle for clothing in addition to the ordinary equipment of the bedroom.

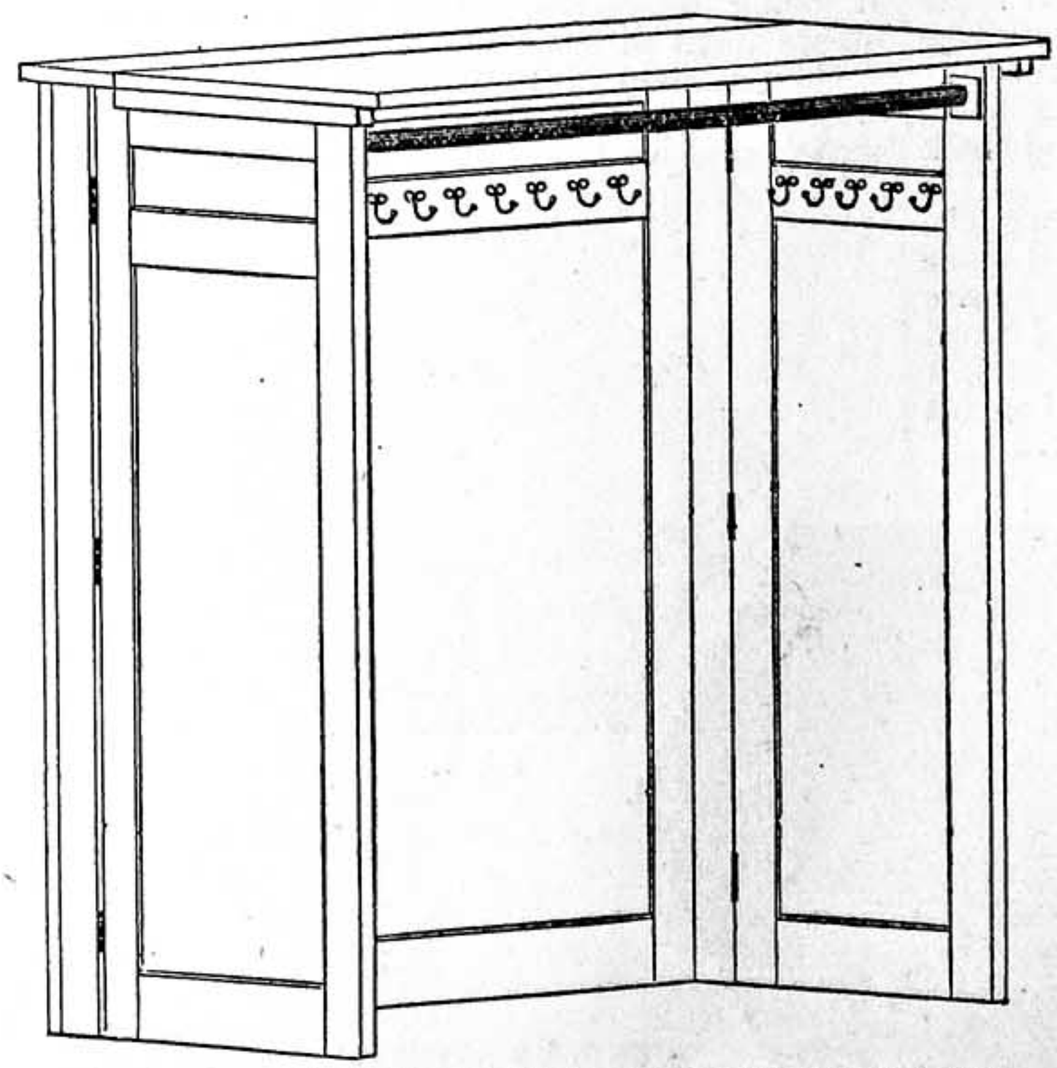


Fig. 5.—Portable Folding Wardrobe, shown complete and open.

ITALIAN DESIGNS FOR FRET-WORKERS.

BY I. N. TARSIA.

ARTISTIC TREATMENT AND STYLE—MARQUETRY—XYLONITE — SUBJECTS OF DESIGN — MILAN CATHEDRAL DESIGN—MINIATURES.

ENGLISH, American, and German designs are known to all fretworkers in this country, and without any desire to disparage them, or to deny the excellence of many of them, the knowledge that a large series of Italian origin may be had will be welcome to those who wish for some variety. There are, no doubt, several collections of designs published in Italy, but, so far as I know, there is only one of them which is obtainable in this country, and the designs of which it consists are not so well known as they deserve to be. As I conceive it to be the duty of readers of WORK to proclaim for the benefit of their fellow-readers anything that may be of interest, I have pleasure in writing these notes.

That the artistic merits of these Italian designs, which, so far as I am aware, are only obtainable from Mr. Busschotts, Park Lane, Liverpool, are far superior to the average English and American productions, will be easily understood. They are, indeed, the work of artists, and bear, perhaps, a closer resemblance to the French than any others with which I am acquainted in delicacy of treatment. They, however, form a class by themselves, and it is only natural to find that many of them are in the style of the beautiful Italian Renaissance. Those readers who are acquainted with this will easily understand that a successful rendering of this in fret requires some very fine work, such as will tax the skill of the most accomplished sawyer. There are, however, many designs which, while equally beautiful, are of a simpler character, but speaking of them as a whole, anyone who can cut the designs nicely will find no other fret patterns beyond his capacity. For overlays or inlays most of the designs are well adapted; while those who possess some skill in colouring, or adapting colours, will have no difficulty in working them up as elaborate marquetries.

Ivorine, or xylonite, has been recently referred to in WORK, and I may say that it is a very good material in which to work up even the finest of these Italian designs as inlays, and much easier than veneers or thin woods.

In the collection are found the usual articles which are mostly made up in fretwork, such as boxes of various kinds, brackets, etc., etc.; and there is one specially noteworthy design, or rather series of sheets, for the formation of a model of Milan Cathedral. This wonderful article in fretwork, which, by the way, I understand, has lately been completed by one of Mr. Busschotts's customers, contains no fewer than 3,621 pieces, measures 6 ft. in length by 3 ft. in width, and stands 4 ft. 6 in high. It is quite the largest and most important design ever attempted in fretwork. Perhaps someone will get up the "Milan Cathedral" for a future WORK Exhibition. The designs themselves are printed in solid blue, and the various parts of the articles represented are shown in the clearest way.

I do not think Mr. Busschotts has catalogues showing the miniature designs, at least I have never seen any, as my usual plan has been to call in and make a selection from the sheets themselves whenever I have been in his neighbourhood. I understood lately, when speaking to him on this subject, that he intends to have sheets of miniature designs; so possibly by the time these remarks meet the reader's eye they may be ready. With this, however, I have nothing to do, and, having drawn the attention of those who wish for designs quite distinct from those usually seen, I must leave them to take care of themselves. As I have many of the Italian designs, I shall be happy to answer inquiries respecting them in "Shop."

MEANS, MODES, AND METHODS.

A SIMPLE AMBULANCE.

SOME of the readers of WORK may have invalid relations or friends that have to be carried from room to room. My wife has been obliged to lie prostrate for the last ten months, and having to be carried, set me to work to devise a simple ambulance, which has answered so well that I think it may be useful to others. I went to the upholsterer's, and bought two 6 ft. lengths of common cornice-pole (2 in.), for which I paid 2s., but any similar pieces of wood will do if nicely rounded. I then went to the linendraper's, and got 4 yards of strong unbleached calico, 30 in. wide; and with this made two bag-like cases, 32 in. deep by about 2 ft. wide. These are passed under the patient, one under the legs first, and the other under the body. This can be better done than if the sheet was all in one piece. The two poles being then passed through the sides of the bag, forms a simple and safe hand-barrow. Of course many will ask, where is the difference between this and a stretcher? I claim, first, the simple form, and attach great importance to it being in *two pieces*, as the use of it will soon prove. Then, why is it necessary to have a bag-like arrangement, and why not two cases for the poles? First, I say it is stronger for the same kind of cloth; and then, being without seams, it is smoother to lie on. The width should be according to the size of the patient; but I found it a mistake to have it too wide, as the patient sank down in a most uncomfortable manner; 20 in. to 26 in. will be enough for any person. Then the cost—only 3s. or 4s.—is something.

I have spoken of this simple ambulance as being suitable for home use, but I am inclined to think that it is equally well fitted for general use, and that in cases of illness or accident in the street it would prove far more desirable for the sufferer than the ordinary stretcher.

PHOTOGRAPHIC TENTS.

BY AN OLD HAND.

INTRODUCTION—MEANS OF CONVEYANCE—VARIOUS TENTS AND CHANGING BOXES—COVERING—FITTING—LIGHTING—VENTILATING—PACKING.

FORMERLY a photographic tent was as much a necessity as a camera, but with the advent of dry plates, most of the chemical manipulations required to make the negatives have been conducted at home, where a suitable room could be prepared for development and the prolonged washing requisite under the new order of things. The few minutes' washing formerly required has changed now to so many hours, and the development much simplified. Plates can now be kept months after exposure, and developed at leisure. The fact of immediate development being unnecessary, without entailing any deterioration of the results, has induced a general practice of bringing home the exposed plates; thus avoiding the incumbrances of tent and chemicals being taken on tour as a necessary part and parcel of the photographic kit.

The outdoor photographer of the present day has no idea of the number of bulky and weighty articles his less fortunate predecessor of years ago had to put together and convey with him if only two or three negatives were required. I use the word "convey" advisedly, as carrying was quite out of the question, unless one or two other persons were pressed into the service; even then it was somewhat a toil of a pleasure. If going single-handed, a truck, or wheels in some form or another, were generally used. Professional photographers on the warpath often had a single horse carriage fitted as a laboratory, which was, perhaps, the most convenient tent of any, and the working conditions rendered similar to those at home no small advantage, when taking a good negative was always an extremely critical and careful operation under any circumstances, and a good, clean, brilliant and soft negative was something to be proud of. Tents are, however, even now sometimes required. It may be necessary to finish a negative off on the spot, so to say, to test an exposure, or for some other reason; and although an absolutely dark closet and a small table are all that are required in the way of an operating chamber, these are not always available nor convenient. A tent will then be found to tide over the difficulty, as it can be set up anywhere indoors or out of doors, and make the photographer independent of any concession, either graciously or grudgingly given. Some people have a great objection to their furniture and fittings being splashed and stained, and do not go into ecstasies when a brown patch gradually develops on the drawing-room ceiling. A tent set up out of doors, or in an outhouse by preference, avoids a considerable amount of friction with the household powers that be, and conduces to general good feeling all round.

In this and a paper to follow I propose to select a few of the most useful forms of tents and changing boxes, with illustrative diagrams that will enable anyone with a small amount of constructive ability to make one for themselves. The variety of forms of tents are legion. Two or three points in all forms should never be overlooked. These are plenty of room to work in, good ventilation, and convenience of arrangement. Tents may be roughly classed into three species—first, those that are portable laboratories, in which work can be as easily done as in a properly appointed dark room at home; secondly, tents that can be used for development, but more generally for changing the plates or fitting the slides; thirdly, those for changing the plates only, that may either admit the operator to work inside or to remain outside with his hands passed through sleeves, and either watch the operation through a small ruby glass window with a face piece, or trust entirely to feel.

No. 1 represents the most elaborate, or I should rather say convenient, of the tent tribe, being, indeed, a perfect laboratory of its kind, and in which almost any sized plates in general use can be conveniently manipulated. It consists of a tray made watertight, 36 in. long by 18 in. wide, and 4 in. deep, made of ¾ in. pine, and clamped at the corners—in fact, made strong and serviceable as a packing-case, for which it has to do duty.

Inside this tray, at each corner, is fixed a square iron socket to hold the uprights that form the framework of the tent. A hole is pierced through one corner for a rubber tube to carry away waste water. Centrally another hole is made, strengthened with a brass plate for a bolt to attach it to its support, which may either be a very strong tripod or, much better, the box in which the chemicals, etc., are packed. A narrow detachable shelf is fitted to the side away from the operator for bottles, measures, etc. The frame consists of ¾ in. square rods. Two pairs are hinged together, as in diagram; the two back uprights and two cross-pieces are separate. The front uprights are 3 in. shorter than the back ones, so that, when fitted in place, the roof will slope upwards towards the back, giving more head room than if they were on a level; the longest pieces, which are the two back uprights, are just the length to lie in the tray for packing. The cross-pieces which bind the sides together are provided with pins, with heads fitting into slots on the inside sides of the uprights. The whole is then covered with a suitably-shaped bag made of three thicknesses of twill, and bound, the inner ones being respectively red and yellow, and the outside drab or black. By cutting away the outside layer for a space of 12 in. by 8 in. in the front of the cover, just above the tray, a window is formed; or, if preferred, an opening can be made through all the material, and a light wooden frame screwed to it, in which ruby glass can be slipped for those who prefer this mode of illumination. An extra curtain of yellow or red may be placed inside and hooked up out of the way when the light will permit. Several hooks and pockets are made inside to contain dusting-brush and other little useful items that are to be kept dry and clean. A strap inside the cover, made of 3 in. webbing, attached to the front and two sides, fastens round the tray with a buckle, keeping it taut and light-proof. On the left side a bag is attached to the cover, hanging outside the tray and opening inside, to contain a vertical hypo. fixing-bath, thus economising the room and putting a troublesome solution as much out of the way as possible. The back part of the cover is made on the cross-over principle, and the operator, on taking his place inside, hooks a strap attached to this cover round his waist (as he sits on a camp-stool), which effectually excludes all white light, and leaves a roomy, comfortable space to work in. The length of the cover is such that, when set up, it will fall an inch or two on the ground—an extra precaution against the admission of dangerous light. On coming out of the tent the folds of the cover can be thrown back, and thus thoroughly rid the tent of any disagreeable fumes from ammonia or anything else. For ventilation, a sleeve or a box ventilator can be let in. The sleeve ventilator is a tube of twill about 4 in. in diameter and 1 ft. long, that when in use is filled loosely with hay, grass, etc., or anything of the kind that may be available to allow passage of air without light, and lie on the roof of the tent. The box ventilator (Fig. 2) consists of a ring of metal—tin will do—3 in. or 4 in. in diameter and about 1 in. wide, securely fastened into an opening in the roof of the tent, into which is brought another metal cylinder with diaphragms alternately fastened to each side to act as a light trap and not interfere with the passage of the air; a bit of muslin may be fastened over the top to keep out dust. This ventilator is suitable for any tent that may require one. It will be seen from the diagram of the tent that the rods of the side frame project over, or rather beyond, the head of the operator for the sake of gaining room and air space.

A shallow waterproof wooden tray 18 in. long, 15 in. wide, and 2 in. deep, with an indiarubber tube securely fastened in one corner, and which can be passed through the tent tray, acts as a sink and also to pack in developing dishes, etc., in travelling. To pack, remove the cover, take the frame to pieces, laying them in the tray, fold up the cover, lay it at the top, and pull over all a canvas waterproof cover, and strap together. This, although a heavy tent, is, nevertheless, a most useful one, never gets out of order in any way that cannot be easily repaired, and is thoroughly efficient for any photographic purpose.

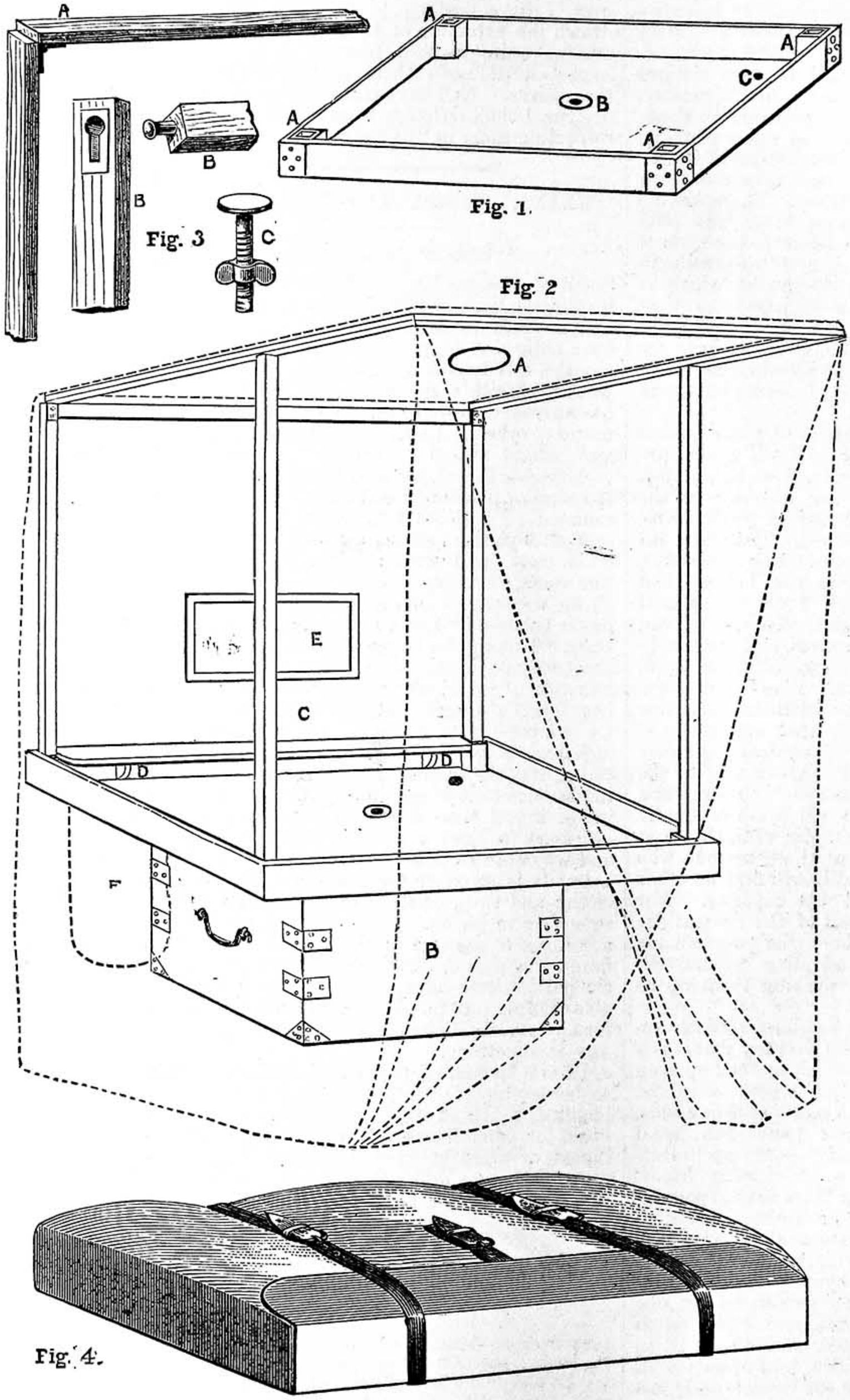


Fig. 1.

Fig. 3

Fig. 2

Fig. 4.

TENT No. 1. Fig. 1.—Tray of Tent—A, Square Sockets for Uprights of Framework; B, Brass Plate with Hole for Nut and Screw to fasten to Support; C, Hole for Waste Pipe. Fig. 2.—Tent set up: Dotted Lines show Covering—A, Ventilator; B, Box for Support; C, Shelf; D, Shelf Support; E, Window; F, Bag for Hypo. Bath. Fig. 3.—Details of Tent—A, Hinged Upright and Top Bar; B, B, Ends of Upright and Cross-Piece with Slot and Pin; C, Nut and Screw to attach Tray to Support. Fig. 4.—Tent Packed.

WIRE-WORK IN ALL ITS BRANCHES.

BY JAMES SCOTT.

STRAIGHTENING, SOLDERING, GALVANISING, TINNING BRASS AND COPPER WIRE, LACQUERING, ETC.—THE SWIFT.

THERE have been several diagrams given in past numbers of WORK, by several correspondents, illustrating the numerous methods adopted by different men to straighten wire as it is uncoiled, or when in irregular lengths; but I do not see any reason why I ought to refer my readers to any or all of them, although the results of using either method would lead to the desired result—in fact, my series of papers dealing with wire-work would be incomplete were I not to say something about this part.

I understand that what is considered a good means of straightening wire is that which I have drawn in Fig. 10. There is a wooden block of three or four inches depth, and of a similar width, and in length what might be considered preferable, into which are inserted at the top a number of iron or steel pegs or nails; the second, fourth, sixth, etc., peg being very slightly to one side of an imaginary straight line, upon the other side of which is similarly situated the first, third, fifth, etc., pegs.

The wire is drawn between these pegs, entering them at one end of the block, and being pulled out at the other end of it. It is advisable to have different blocks and pegs for every few consecutive gauges of wire; but for any of those which do not vary much in thickness to each other, the same block, etc., would serve, as the pegs could then be slightly hammered inwards or outwards, as the case might be, to accommodate properly the wire to be straightened.

If the pegs are so fixed that each row inclines towards the other at a very acute angle, as in Fig. 11, both pegs in each pair touching and crossing each other, as is made plain by the elevation sketch (Fig. 12), very irregular lengths of wire may be comparatively well straightened by being drawn through the holes or arches formed by the different pairs of pegs.

If it is not considered convenient to have the block as a fixture upon the bench, it could be used as a loose affair, and be secured in temporary position when required, by being fitted with a staple at one end, as I have shown in Fig. 13, and having a hook, or staple and hook, in the wall or bench, as in either of the diagrams, Figs. 14, 15, and 16.

As before said, the ways of effecting the straightening of wire are numerous; but these descriptions will be found suitable and convenient.

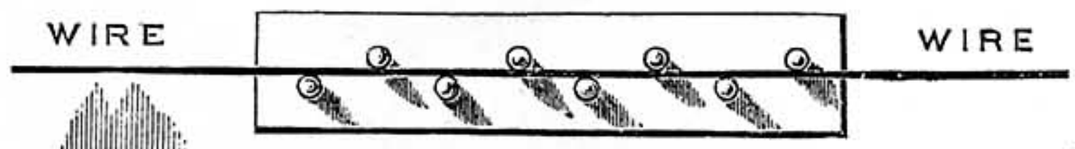


Fig 17.

Fig. 12.

Fig. 14.

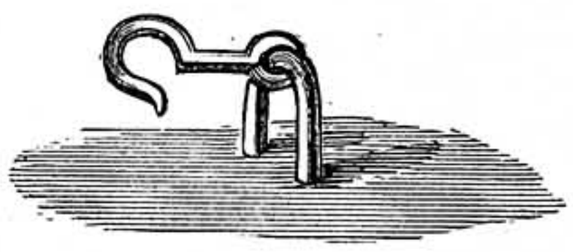


Fig 16.

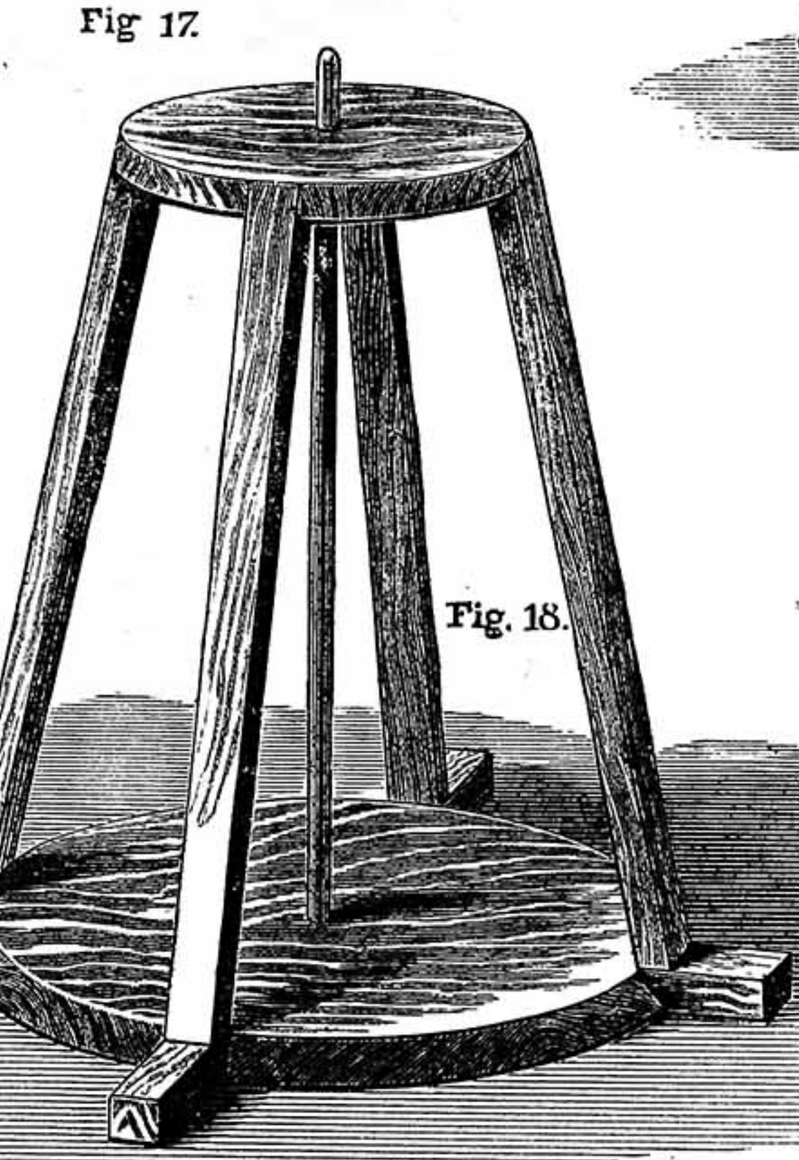


Fig. 18.

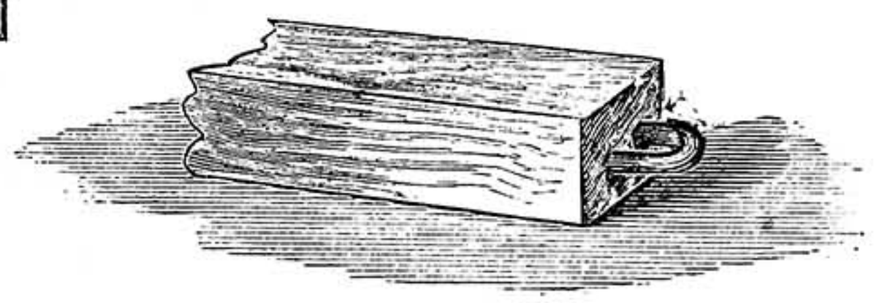


Fig 13

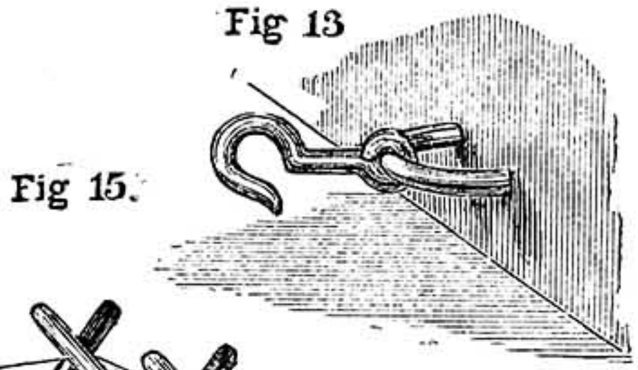


Fig 15.

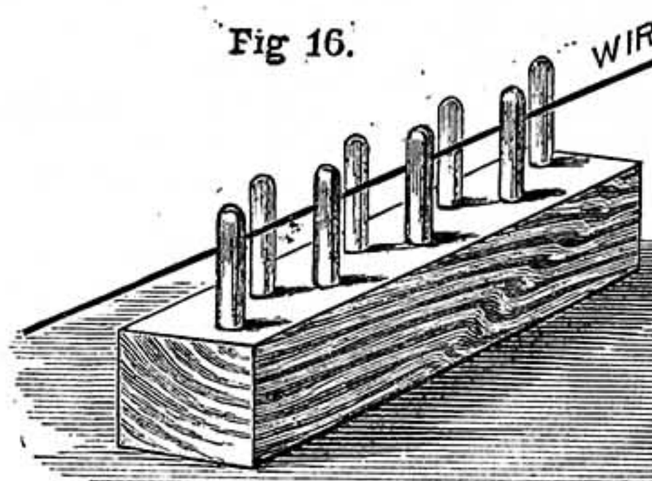


Fig. 10.

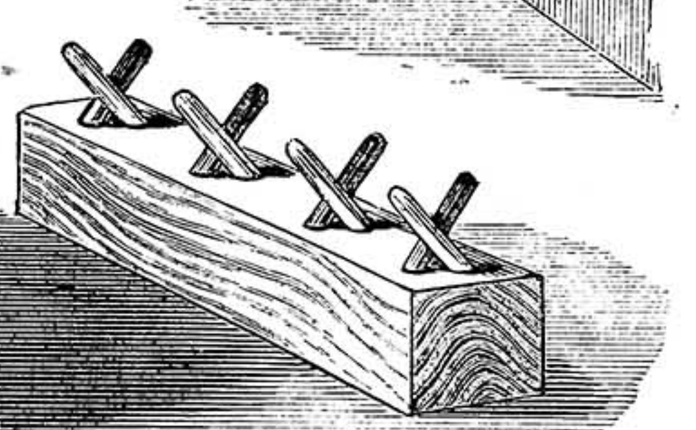


Fig 11.

Figs. 10, 11.—Two Forms of Straightening Machines. Fig. 12.—End Elevation of Machine shown in Fig. 11. Fig. 13.—A necessary Staple in End of Straightening Block. Figs. 14, 15, 16.—Various Means of securing Straightening Block to Bench or Wall. Fig. 17.—Plan of Fig. 10 as seen from above. Fig. 18.—The "Swift," on which Coils of Wire are placed previous to being unwound.

Although the word "lacquering" is used frequently in connection with several operations in different trades, in wire-working it is understood to mean the covering of *brass* wire for purposes of preservation with a certain semi-liquid. No doubt many readers are aware that lacquer is very similar in appearance to fluid gum, and is dealt with, like that commodity, by being contained within bottles. There is a paper on "Lacquering Brass Work" in WORK, Vol. II., No. 55, page 35. I will ask my readers to be good enough to read the particulars therein given—they, in every respect, being quite suitable for application to wire-work.

Galvanising is a very important process, through which an enormous number of wire-work articles pass. I cannot explain the operations having to be gone through for this purpose, for the simple reason that I am entirely ignorant of anything whatever concerning them directly; and, indeed, I see no more reason why I should enter into a description, even were it in my power to do so, than should a writer who gives a design of a piece of furniture, or who speaks of wood-work, enter into details of the art of polishing.

Wire-workers—*i.e.*, the workmen—do not galvanise their goods: they are sent to be so finished at a neighbouring galvaniser's; for such a trade is carried on as quite distinct from wire-work. The same remarks will apply equally to the process of tinning.

Need I say much about painting? What workman is there who could not paint any piece of wire-work to his satisfaction with either enamel or the ordinary stuff? Of course, the article to be painted would have to be entirely free from dirt, etc.; but very few men, I think, need to be told that.

Brass and copper wire, it scarcely needs telling, are more expensive than ordinary wire; and both are, as a consequence, used almost exclusively for ornamental work, such as baskets, screens, etc. Occasionally, however, such articles as fenders and other household requisites are constructed with it.

Soldering is an operation that frequently has to be called to the aid of wire-work, but comparatively few different articles need its assistance. For details of the process, I must refer my readers to Mr. Alexander's paper on "Soldering" in Vol. I., page 257.

The "swift" is an accessory to wire-working, upon which is placed a coil of wire preparatory to being straightened or crimped. A clear idea of its appearance can be gleaned from Fig. 18. In the bench is firmly inserted, in a perfectly perpendicular position, a stout iron or steel rod, upon which will revolve the swift proper. This latter consists, as can be seen by the engraving, of two circular boards, one much smaller than the other, with canted or bevelled edges, connected to each other by three or more uprights.

Each board has a hole bored through its centre, sufficiently large to permit of free action on the part of the swift whilst upon the vertical rod. The larger board rests upon the bench, while the smaller one is placed at a convenient height from it, both being strongly connected to each other by three, four, or more, wooden or metal rails. It is not desirable, however, to have it of any inconvenient weight.

The inside diameter of one coil of wire may happen to be less than that of other coils, and it is to accommodate all dimensions that the swift is made on a graduated scale; for it will be seen that should one coil be too small to fit round the bottom of the swift, it will rest in just as suitable a position upon the sloping rails. If the swift is properly made, it should be all that is required to assist in unwinding any particular coil.

It is advisable that two swifts be used—one much smaller than the other, in order that it can be used for very small coils.

OUR GUIDE TO GOOD THINGS.

*** *Patentees, manufacturers, and dealers generally are requested to send prospectuses, bills, etc., of their specialities in tools, machinery, and workshop appliances to the Editor of WORK for notice in "Our Guide to Good Things." It is desirable that specimens should be sent for examination and testing in all cases when this can be done without inconvenience. Specimens thus received will be returned at the earliest opportunity. It must be understood that everything which is noticed, is noticed on its merits only, and that, as it is in the power of anyone who has a useful article for sale to obtain mention of it in this department of WORK without charge, the notices given partake in no way of the nature of advertisements.*

19.—CORMELL'S PATENT GRIP FASTENER.

A FASTENER for doors and windows that is perfectly secure against all operations from without—operations, that is to say, which may be carried out without injury to glass and frame of window and rails and panel of door—is manifestly a thing to be sought after; and any fastener that cannot be operated on from without, except by violent means, is decidedly a "good thing." Apparently, Cormell's Patent Grip Fastener is a fastener that promises security to those who adopt it—I say apparently, because I have not had an opportunity of seeing and handling a specimen fastener, and am therefore compelled to base my notice and description on the prospectus of the patentee,

Fig. 1.

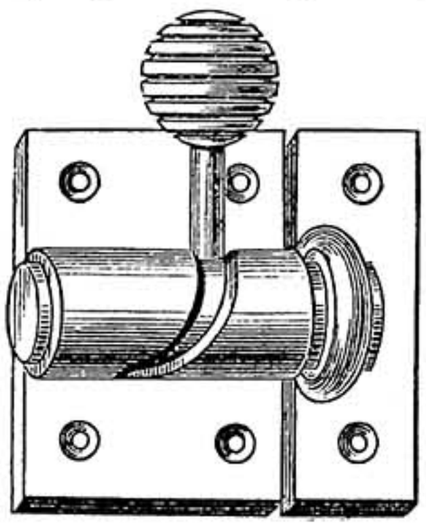
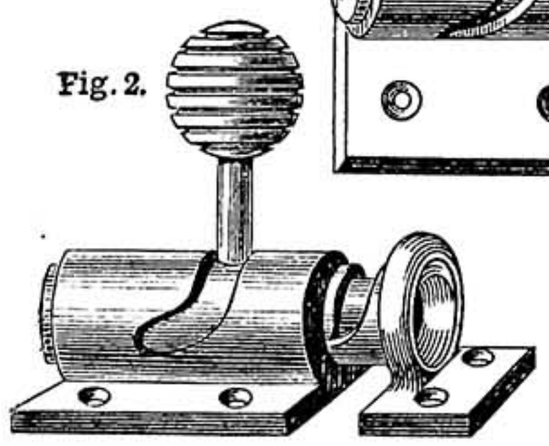


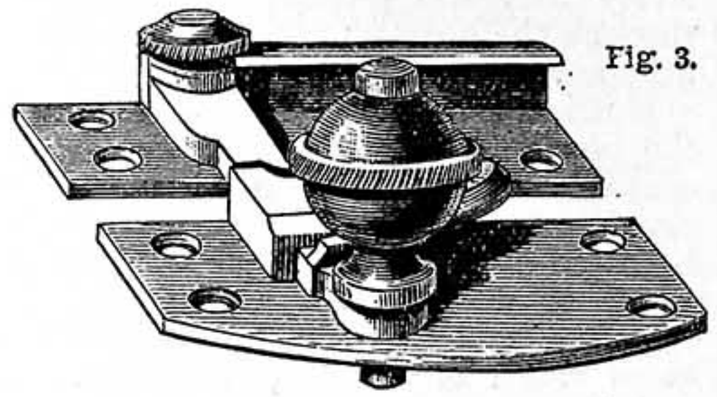
Fig. 2.



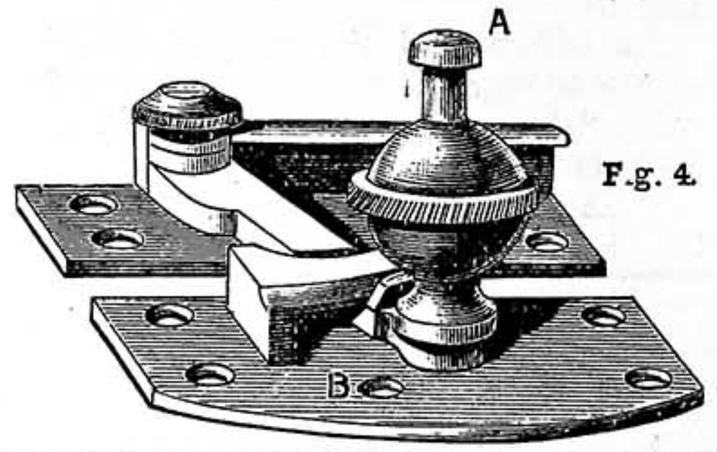
Cormell's Patent Grip Fastener.

Mr. J. Cormell, Lansdown, Cheltenham. The appearance and general construction of the Patent Grip Fastener may be gathered from Figs. 1 and 2, in the former of which it is represented shut, and in the latter, open. There are two plates to be fastened to the door and frame of the door, or to the sashes of the window to which it is applied. The larger plate carries the bolt, and the smaller plate the socket, staple, or ring in which the bolt engages. The description tells us that "the bolt is moved by the action of the arm, which moves it in the barrel," and that the *female* screw on the end of the bolt grips the *male* screw in the staple, thereby tightening the sashes together, if loose, and avoiding rattling

Fig. 3.



A



B

F.g. 4.

Brookfield & Whitehead's Burglar Proof Sash Fastener.

and securely fastening them. Now here comes in the disadvantage of not actually seeing the article to be noticed. I should have thought myself that the screw on the end of the bolt would have been the *male* screw, and that in the staple the *female* screw; but, in determining this, the drawings in the prospectus, which are here reproduced on a smaller scale in facsimile in Figs. 1 and 2, lend but little assistance. Still, there is enough to show that the fastener is a secure one, and is worth looking after, as it is simple, has no spring in it, is thief proof, prevents loose frames from rattling, and is cheap, as it is supplied at the rate of 7s. 6d. per dozen in the ordinary make. For high windows the bolt is made without the knob on the arm, as shown in Figs. 1 and 2, and is actuated by a wheel fixed at the end most remote from the socket. Over the wheel a cord is passed, the groove of the wheel in which the cord lies being fashioned in such a manner as to prevent the cord slipping. The cord may be fastened up on one side of the window in the same manner as the cord of a Venetian blind.

20.—BROOKFIELD & WHITEHEAD'S IMPROVED SASH FASTENER.

The construction of the fastener for doors and windows just described differs materially from that of the ordinary fastener; but this is not the case with regard to Messrs. Brookfield and Whitehead's Improved Sash Fastener, which is represented, when shut, in Fig. 3, and when open, in Fig. 4. At first sight, indeed, one may be disposed to ask in what particular point or points this may differ from the ordinary sash fastener, so much alike are they, and it requires close inspection to find out that these differences are to be found in the increased size of the plate which carries the piece, under which the catch passes, and in the knob of the catch which is pierced from top to bottom to take a pin, A, in Fig. 4, which works up and down in it. When the catch is released, the bottom of the pin moves over the surface of the plate, and the pin is kept in the position shown in Fig. 4; but when the catch is brought completely under the piece that projects from the plate that is fastened to the lower sash, the pin drops into the hole, B, and assumes the position shown in Fig. 3, thus closing the window and securing it against all attempts that may be made to open it from without. When it is desired to release the catch, the pin must be lifted. This fastener, which is extremely simple, and has no spring to get out of order, is manufactured and supplied wholesale by Messrs. Brookfield & Whitehead, 25, Change Alley, Sheffield, who are the makers of other desirable specialities. Its cost is no more than that of the ordinary fastener, and it may be had in brass, or japanned or nickel-plated, of all large ironmongers and builders' furnishers in town and country.

I have purposely noticed this and the Patent Grip Fastener together, as each is a type of a totally different mode of fastening a sash-window. Each, without doubt, will have its admirers, being considerably in advance in every respect of the ordinary fastener, which is so easily thrust back from outside by the aid of a thin steel knife.

21.—THE "RING" CUSHION TYRE.

The "Ring" Cushion Tyre is one among the various forms of tyres of this kind that are now competing for favour and adoption by wheelmen. The nature of the tyre, and the arrangement of the rings from which it takes its name, may be gathered from Fig. 5. The inner and outer metal tyres of the kind in general use by the trade are separately drilled to receive studs which secure the rubber rings in position between the two tyres. The rings are moulded to fit *over* the outer tyre and inside the inner crescent, and their strength is regulated to suit various weights. The spokes of the wheel, in case of necessity, may be replaced without disturbing any portion of the tyres. The objects of this invention are stated to be—1st, to maintain at the point of contact with the road a true circle in the outer tyre; 2nd, to avoid the cutting of the cushion; 3rd, to promote economy of cost, about one-half the weight of rubber being used, inclusive of the outer tyre; 4th, to provide a cushion tyre for narrow forks, which may be easily fitted to existing machines. It is claimed by the patentee that the use of the tyre ensures all the benefits to be derived from the pneumatic tyre, inasmuch as "the shape and position of the rubber rings ensure the most sensitive and perfect action in running. Every ring is in continual play; in the lower portion of the wheel they are in extension; at the sides of the wheel a vertical movement takes place. The double, and hitherto impossible, duty of resisting hard road wear, and, at the same time, of yielding that ease and elasticity essential to the comfort of the rider, is by this arrangement separately provided for. The sole duty of the rubber rings is to carry the weight of the rider in easy suspension, whilst the outer tyre, narrow in width and fairly hard in texture, is propelled with less exertion than the wide soft tyres which flatten upon the ground and add materially to the draught of the wheel. The greatest ease in running, with perfect insulation from vibration, is thereby obtained, the rubber rings acting freely upon the road inequalities, and within one inch of its surface. In turning corners they adapt themselves to the deflection

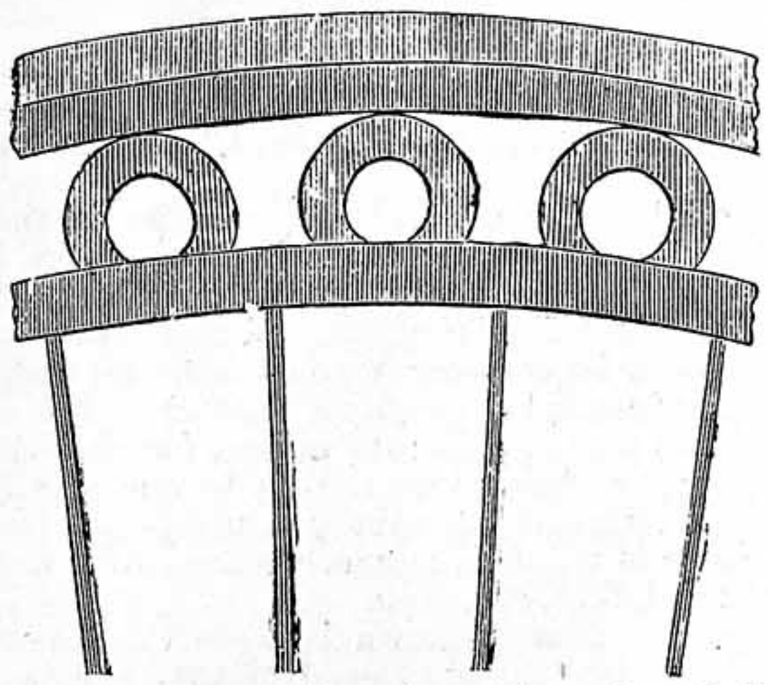


Fig. 5.—"Ring" Cushion Tyre (Rings about half size).

of the rider's weight, and obviate the tendency to side slipping. Travelling against the wind, the resistance would not be greater than with an ordinary solid tyre." The "Ring" Cushion Tyre is applicable for vehicles of all kinds. Complete wheels, tyres, or any of the necessary parts may be obtained at 19, Barbican, London, E.C., the London Depôt of Messrs. Thos. Smith and Son, Saltley.

THE EDITOR.

SHOP:

A Corner for Those who Want to Talk It.

*** *In consequence of the great pressure upon the "Shop" columns of* Work, *contributors are requested to be brief and concise in all future questions and replies.*

In answering any of the "Questions submitted to Correspondents," or in referring to anything that has appeared in "Shop," writers are requested to refer to the number and page of number of Work *in which the subject under consideration appeared, and to give the heading of the paragraph to which reference is made, and the initials and place of residence, or the nom-de-plume, of the writer by whom the question has been asked or to whom a reply has been already given. Answers cannot be given to questions which do not bear on subjects that fairly come within the scope of the Magazine.*

I.—Letters from Correspondents.

Work Exhibition. — W. C. (*Shrewsbury*) writes:—"I beg to offer you my heartiest thanks for the medal, prize, and certificates awarded to me in Work Exhibition, and which I have safely received. I should have acknowledged their receipt sooner had I not been very fully employed in moving from Birmingham to Shrewsbury, and taking up another situation. I am glad to believe that my success in Work Exhibition may have been a determining factor in obtaining for me the situation above mentioned, in which I benefit to the extent of £60 per annum. The award of the jurors came at the very time I was making my application; and I, of course, made mention of the fact of my success. Though I have no direct authority for stating that I owe my better situation to my Work award, I feel confident it had its share (and probably a large one) in obtaining my appointment in the face of over 300 competitors. I am delighted with the medal, which is a little work of art, and also with the prize and certificates, which I shall always be proud to show to my friends."

Protection for Patents.—A. J. W writes:—"I have duly received medal and awards safely, and must say that I am very well pleased with them, and thank Messrs. Cassell & Company for their kindness and enterprise in the prizes and awards given, and labours in connection with the late Exhibition—which could not have been an altogether simple matter from first to last. At any future time, should you think of inaugurating another exhibition, I shall be only too pleased to do all that lies in my power to give assistance, however small it may be, in exhibiting to the best of my ability. Last month a provisional protection was granted me for a patent banjo, in the taking out of which I was much assisted by your article which appeared in Work; and hope in another month's time to procure a complete patent for same without the expense of an agent. I may add that the drawings I sent in to minimise labour were incomplete."

Work Exhibition Certificate Frame.—W. J. (*Laurencekirk*) writes:—"Now that the exhibitors at the Work Exhibition are in possession of their certificates, I have no doubt that many, like myself, wish to frame them; and for those who use the carving tools an appropriate design given in Work would be hailed with delight by not a few."—[Will some reader kindly consider this?—Ed.]

II.—Questions Answered by Editor and Staff.

Cutting Elephant Teeth.—J. S. S. B. (*Dublin*).—I presume from your letter that it is your idea to make elephant's grinders into boxes. If that is so, then all your difficulty will vanish if you once know how to get through, or get rid of the external layer of enamel. It will really be best to get a lapidary to cut the teeth across with his slitter, but the following is a way that you can do yourself:—Get some iron binding-wire about the thickness of a pin, and twist two pieces up together like a cord, say about 2 ft. long; mix up some flour-emery with water and charge this twisted wire with it. Now, for the next step, you must devise means yourself to attain this end—viz., that the tooth has got to have the wire passed backwards and forwards like a saw until you have worked through the enamel. Fixing it in one of your bow saw frames will do, or you might fix one end of the wire and hold the other with your hand while you pass the tooth rapidly up and down. As the wire is merely for the purpose of holding the emery, it can be replaced by a straight piece of hooping-iron, and you can get through the enamel with that; but, as I said, a lapidary's slicer which is charged with diamond dust is best. So much for cutting pieces off; now, if the outside (enamel) is to be got off so that you can carve the exterior, the handiest method for you is, I should think, to take it to the grindstone and grind it off. If these hints are of no use, you have only yourself to thank, for no details are given in your letter.—H. S. G.

Fret Machine.—G. G. (*Abergavenny*), requires further particulars concerning my fret machine (see page 846, Vol. II.). I feel it a pleasure to answer the above from one who, I think, sees the advantages of this machine—firstly, its simplicity; secondly, its having a true vertical stroke; thirdly, its lowness of price for construction. I will now endeavour to give him and others all the particulars so far as my ability will allow. Fig. 1.—Front view of table, from the ground to top of table, 2 ft. 5 in.; S, legs of table, four in number, 2 ft. 4½ in. long, 2 in. wide, 1½ in. thick, secured to A (top of table) with screws; D are the leaves of the table—you can dispense with these, if you like—1 ft. long by 10 in. wide, ½ in. thick, secured to table by two hinges, 1½ in.; P are the stretchers for keeping leaves of table in position, 1 ft. long by 2 in. wide, ½ in. thick; A, top of table, 7½ in. wide, 2 ft. 4 in. long, ½ in. thick; if you do not have leaves to your table, you can then make the table what width you like, to suit your own purpose; E, treadle, secured by means of a small hinge, 1 ft. long, 4 in. wide, or, if you make the table wider, that will be wider, but not longer, in proportion; N are small pieces of wood, ⅜ in. square, 2 in. long, to support cross-pieces marked T. Fig. 2 represents table reversed or bottom upwards, to show how stretchers are placed and secured. The two pieces of wood, P, are movable, as shown per dotted line, and are secured to the table by stout screws. Fig. 3 (there are three parts included in this).—We will take T first, it being a strip of wood 4 in. long by 2 in. wide, with a 1 in. square hole cut neatly through the centre; you require two of them, as in Fig. 1; they are to form a guide for the bottom cramp, marked C; Z is the most complicated part of the machine, it being a knuckle-joint. Without this you do not obtain a true vertical stroke. If you cannot make this, although very simple, I have another way, which I will explain in Fig. 5. To make this knuckle-joint, get a piece of iron ¾ in. wide, 1½ in. long, 1 in. thick. Cut the top flat, so as to suit the end of the arm. The lower part of the joint which holds the saw is part of any old frame filed to suit the lower slot, secured so as to work easy by means of a small rivet. Fig. 4 is the bottom cramp driven into a piece of 1 in. square wood 14 in. long (R); M is a small piece of wood driven through C to form a stop, so that, should the saw break, C cannot slip through T. Fig. 5.—If you cannot make the knuckle-joint, proceed as follows: Cut your old frame which you have been using, according to Fig. 5, at C; secured to arm with screws it makes a very good substitute, but not so good as the drawing F, Fig. 3. Fig. 6.—Stump of wood 6 in. long, 2 in. square, with a slot cut to allow arm of machine to work in; B is a ¾ in. ball to secure arms to stump A. Fig. 7.—Distance from s' to s, 1 ft. 8 in.; from s' to P, 8 in.—the whole to be ½ in. thick; O, piece of wood 1 in. by ½ in., to correspond with the length of the arm, secured, as you see in Fig. 7, with strips of indiarubber to form a spring; D is a guard to prevent the arm from rising too high when saw breaks: size, 1¼ in. square; M, stay for legs, 1¾ in. by ½ in. Fig. 8 is front view of Fig. 5.—J. H. W.

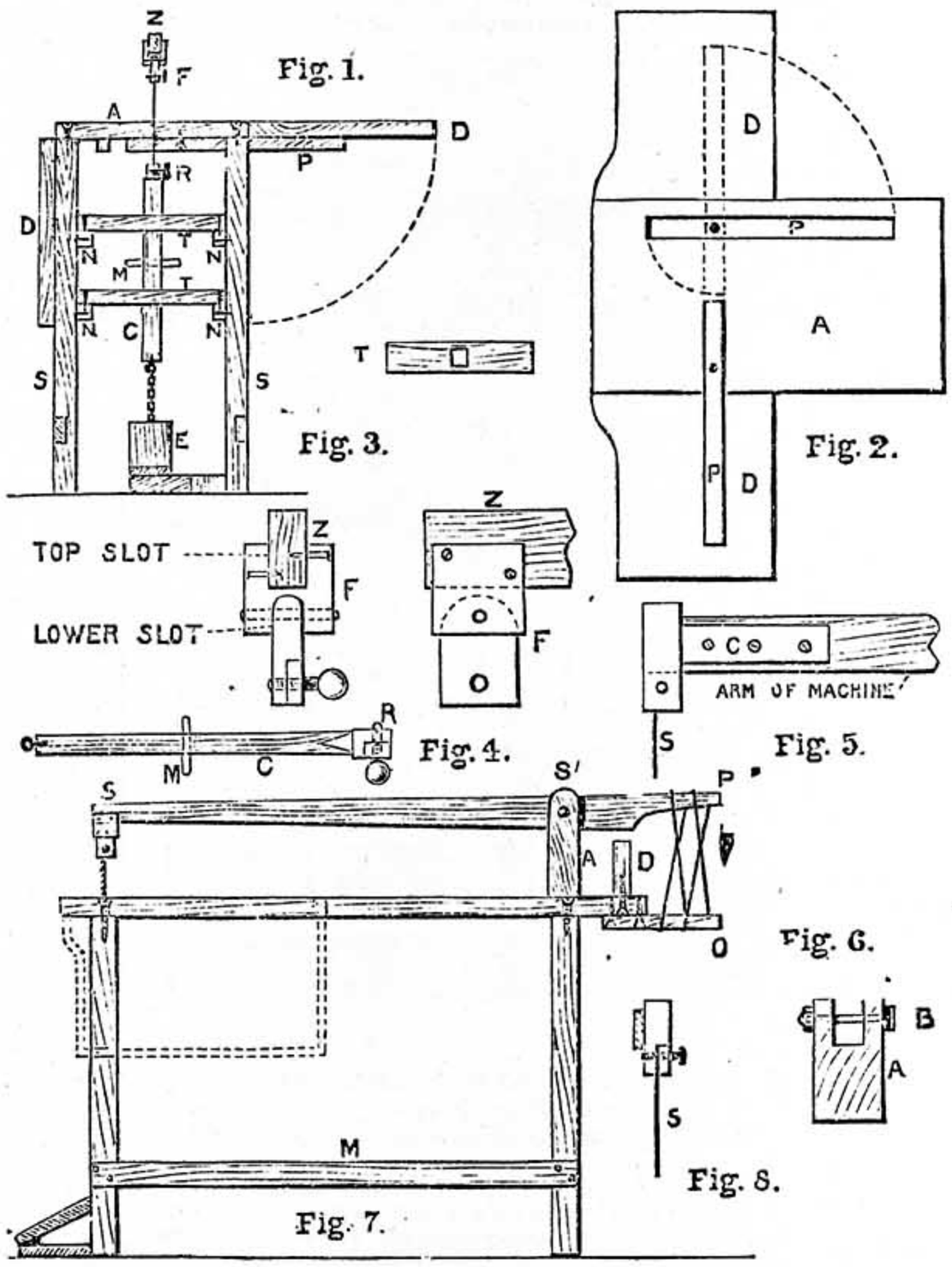


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6. Fig. 7. Fig. 8.

Fret Machine and Parts.

School Blackboards.—J. J. (*Leeds*).—Refer to the Index of Work, Vol. II.

Cutting Mounts.—Omar.—It is a great pity to cut your old engravings, as by so doing you destroy any value there is in them. Some rare specimens of Hogarth's engravings fetch very high prices. The best method I should suggest is, procure sheets of card large enough to cover present margin, and have a suitable equal margin; measure size of engraved part, or that which you wish to appear, and mark the size in pencil square upon centre of your card with a sharp mount-cutter's knife; cut the centre out; procure a second cheap cardboard and lay your engraving flat thereon, just attaching the corners, and fix your mount over engraving to board you have the engraving on. You will then have it perfectly flat for framing, and can at any future time remove without injury should you wish to realise. There is also a special graining known in the trade as "Hogarth pattern," and designed by him for his engravings, and very suitable. I should consider in the way of mounts it is cheapest to get them cut by a mount cutter, for they will mount them without fear of injury in front and back mounts for 1s. 3d. complete, 2 ft. 6 in. by 1 ft. 10 in., with edge of bevel in gold or plainly cut, and you can have a variety of tints to select from. The City Frame Company, 29, Basinghall Street, E.C., are not far from your address, and are wholesale mount-cutters, and who would advise you as to whether your engravings would clean, as old engravings with their original margins are better than mounts, and can be cleaned if not too far gone.—G. R.

French Clock.—R. M. (*Liverpool*).—Before altering the snail make sure the fault is there, for if it has struck all right till now, the fault may be elsewhere. Take off hands and face and examine the wheels that carry the hands, and you will see a dot mark on each; arrange the three dots in a line with the pivots of the minute, and shake minute or cannon arbor, and then try if it strikes right, as this, if only one tooth is wrong, with a graduated snail is often sufficient to throw the whole striking wrong. If not right, see if either arm of the rack is loose, and rivet up if it is; then put on the minute hand and turn round, and see that rack hook falls fair and clear in each tooth as the wheels go round; if not, mark where they do not fall deep enough and slightly file the snail. Do not overdo it: better take a little twice than too much at once. I forgot to say, examine rack teeth and see if any are bent. Should the rack fall too far or not enough at *all the hours*, bend the rack arm that rests on the snail down or up a little, and test it at the one o'clock hour. To make a new snail, fit up a piece of brass on the hour wheel, put a sharp-pointed pin in the rack arm, put the rack hook in the first tooth, let the sharp pin rest on the new snail piece, hold the rack and hook steady, and turn the snail round. Now let another tooth of the rack down, and repeat the movement till twelve teeth of the rack have fallen and you have twelve circles on the snail piece. Next put your minute hand on and hold it up tight at twelve; let the rack fall on the twelve teeth; press the pin on the snail, at the same time drawing it fully up: this will give a radial line. Now turn the minute hand round an hour, and let rack down and draw it up; do this twelve times, then your snail will have twelve circles representing twelve hours, and twelve lines (radial), giving you the length the steps must be. Now all you have to do is to file down to the first circle the distance between two lines, between the next two, or, rather, one of the first you used and another; file down to the second circle, and so on till you have the twelve steps. You will find this the best way to mark it out, I think, as should your rack teeth be ever so uneven, having marked the snail by it, it is sure to drop right.—A. B. C.

Algebraical Question.—Mathematics.—You should submit your question to a scholastic paper. It would have no interest for the majority of our readers, and "Shop" space is valuable.

Cocoa-Nut Fibre.—J. I. (*Bath*).—Try the following places for the above:—Messrs. Treloar and Son, Ludgate Hill, London; Messrs. P. Maddin and Sons, 98, Borough High Street, S.E.; or write to Mr. A. Robottom, Commercial Sales Rooms, Mincing Lane, London, E.C.

D Dulcimer.—G. H. (*Camberwell*).—The measurements are taken "over all"—that is, including blocks and facings—and, as before stated, the distance from back to front is 1 ft. 4 in. It has forty brass and forty steel strings, divided into alternate groups of four each, commencing with brass

at the bottom. Making the soundboard thinner would hardly be likely to improve the tone. The only way to ensure a good tone is to use nothing but the best material, and to be very particular about the workmanship to see that everything is cleanly and neatly finished, and that no more varnish is used than is necessary to get a good face. For this reason a polished sounding-board is best. The piccolo D is half the size of the other in every way as far as the shell of the instrument is concerned. It has, however, the same number of notes, and consequently the same number of strings. Particulars of this are given, in reply to A PLAYER, in No. 90, page 615, Vol. II.—R. F.

Sign-Writing Charges.—CONSTANT READER.—I never attempt to give these: every man must find this out for himself, and all I can do is to refer you to Laxton's "Builders' Price Book," published annually by E. & S. Spon, Strand, London. There are, of course, all prices, a good workman naturally commanding a better figure than a poor hand, who is often willing to do work at a starvation price.—H. L. B.

American Leather Cloth.—C. L. L. (*Queen's Walk*).—The manufacture of this article was introduced from America about the year 1851, and met with a large sale up to 1861, when it fell off greatly. We are not aware that the composition was ever made public, nor do we know much about it. A Mr. Dodge, however, is said to have taken some patents for its manufacture, and we believe he originally introduced it here. We do not think it could be used as proposed by our correspondent, but requires to have special plant and means provided for its manufacture and use. There is, or was some years since, a large factory for its manufacture at East or West Ham, or somewhere in that neighbourhood; but whether it is still in operation we do not know. If our correspondent would state clearly exactly what he wants to do, perhaps we might be able to help him.—C. E.

Royal Navy Carpenter.—DARKEY.—In many cases, if not in all, carpenters in the Royal Navy are obtained by the Government from the dockyards. Applicant will, of course, have to be physically fit to be a seaman. You do not state age or give any idea of educational or mechanical attainment. Apply by letter to the nearest dockyard. The pay is £50; officer, £100 to £150; chief carpenter, £164; extras, £5. The above (if you can get it) is better than artificer in Royal Engineers—the pay is 1s. 11d. per day extra to regimental pay.—B. A. B.

Hair Sieve Bottoms.—C. B. (*London, E.C.*).—You should make your address known to HOOPBENDER by advertising it in our cheap "Sale and Exchange" column.

Engraving on Metals.—PERCY.—This subject has been treated in WORK, with full illustrations, and will be found in Nos. 35, 38, 43, 45, and 48. Messrs. Field & Tuer, Leadenhall Press, London, E.C., publish a shilling book of letterings. Fairbairn's "Crests and Monograms," price 42s. (Lewin, 20, Ludgate Hill, London, E.C.), will probably suit you; and Messrs. J. Sellers & Son will supply you with a complete outfit of engravers' tools. Consult "Shop" in back numbers for "wrinkles."—N. M.

Engravers' Wages.—F. M. T. (*Swansea*).—You ask for information as to the wages of engravers. It is a large subject, and requires treatment from various standpoints. Broadly speaking, the wages of an engraver range from 12s. up to 120s. per week. You will quite understand that there are engravers and engravers. A general engraver is not often found as a journeyman; the simple fact of his being able to take up and execute general work enables him to take a small workshop and work for his own individual profit; and his earnings may be from 30s. to 50s. per week. Working under such a master, the engraver would receive from 4d. to 8d. per hour, according to ability, as, of course, the master wants a profit on his employee's work, as well as to pay his portion of shop-room, firing, and lighting. Heraldic and inscription engravers will earn about from 9d. to 1s. per hour, depending on ability and continuous work. I know nothing of the present prices of door-plate work, but should know what to charge if I had one to cut, much depending on the size and style of letterings.—N. M.

Cutting Stencil Plates.—W. E. T. (*Hibbard*).—The plates may be cut in a fly-press, but the expense of the cutting-out tools will be very great, unless a great quantity were required. They can be filed out beautifully clear, requiring nothing but a little flattening. The best way of cutting out only a few stencil plates is with the graver, as follows: First, procure a piece of hardish wood, and have it planed smooth; next procure some sheet zinc of the proper thinness, and cut out to the required size. These will not be quite flat, therefore get two sheets of steel of any convenient size *larger* than your sheets of zinc, and about ¼ in. thick. Place these sheets of steel in the fire until hot—not red-hot—and place half a dozen or so of zinc plates between them, and then and there screw them up tightly in the vice until cold, when they will be found to be flat. Next cut out of cardboard the letters you are desirous of cutting in stencil, and mark them in outline on the zinc with a sharp point or etching needle; bore a small hole at each corner, and tack down with a common iron tack. Next sharpen a "lozenge" graver (see Indices Vols. I. and II.) rather, but not too acute an angle, and cut away till you cut through the zinc. If you are not used to handle a graver, you will require considerable practice; but with courage and perseverance all may succeed, and stencil cutting is not so difficult as some other kinds of work.—N. M.

Cutting Machine.—A. R. B. (*Dublin*).—There is no reason why such a machine should not work well, provided (1) That the board is well supported *up to the extreme end;* (2) that the cutter has some traversing as well as descending movement; (3) that the cutter is sharp and thin; (4) that only small pieces are removed at a stroke; (5) that the workman has ample power. Given wood cut to the proper lengths and at the proper angle, very little shooting is needed, and end grain is not very often used as a glue joint.—B. A. B.

Corrosive Sublimate (or Chloride of Mercury).—BUSYBODY.—This may be obtained at any chemist's, and costs about 4d. per oz. Block or pure tin can be had at almost any ironmonger's, and certainly of any dealer in plumbers' requisites. See reply to AMATEUR (page 13, No. 105, Vol. III.).—OPIFEX.

Combined Clothes and Tool Chest.—A. R. (*Somerton*).—Considerable annoyance would probably result by storing your clothes and tools together in one box; but by adopting my present suggestions you would not experience trouble in gaining access to either a tool or a garment. Two boxes are what I advise you to use—hinged together

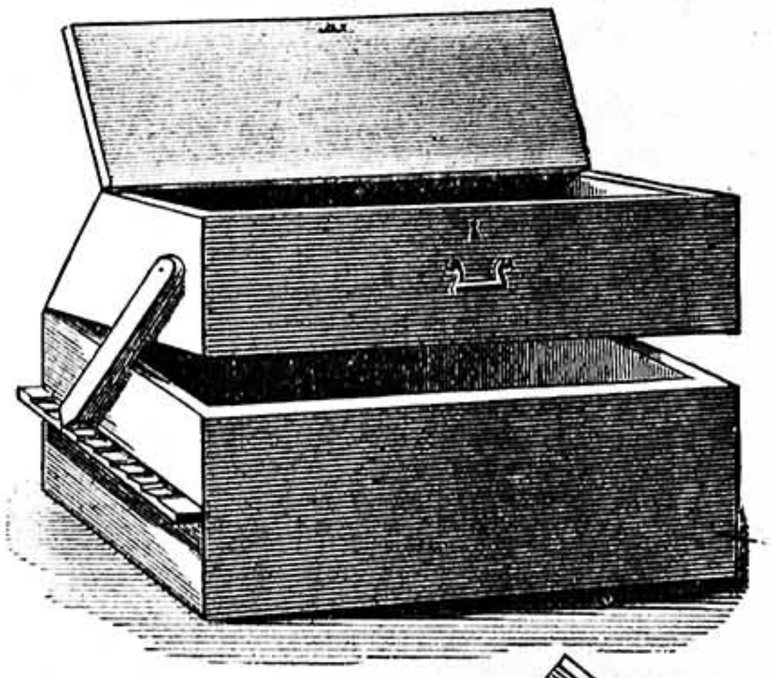


Fig. 1.

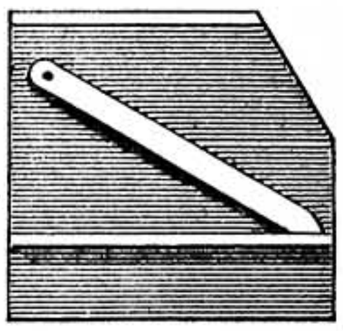


Fig. 2.

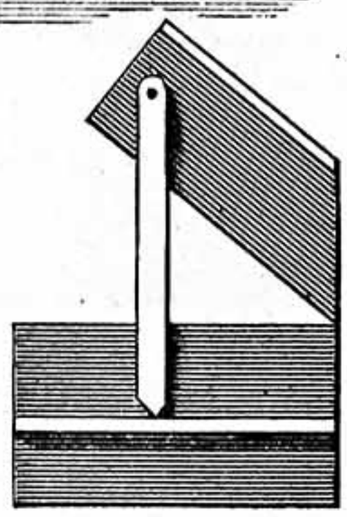


Fig. 3.

Combined Clothes and Tool Chest. Fig. 1.—Chest shown open. Figs. 2 and 3.—End Elevation, showing Box closed and open respectively.

on one side as in Fig. 1. The back of the top one should be at other than a right angle to its bottom, to permit of its being opened sufficiently when required. At each, or only one, side of the upper chest, outside, pivot one end of a rail, allowing the other end to rest upon a notched gallery on the side of the lower chest. When the top one is lifted, the rail or rails, as the case may be, would retain it in that particular position.—J. S.

Clarionet Pitch.—TOPPER.—Your clarionet is a half-tone *too flat* for your piano. Clarionet players, as a rule, have a difficulty in getting down to the pitch of pianos, which are nearly always more or less flat. We think TOPPER must have a clarionet made in the French pitch or "diapason normal," which would be about a semitone below English pitch. If this be the case, it is impossible to bring the instrument up. Clarionets can be sharpened slightly to the extent of less than a quarter of a tone without affecting their *justesse* by removing the German silver tip from the barrel or socket of the instrument—*i.e.*, the small section which receives the mouthpiece and top of the first joint—and turning it down about the width of the tip—say ⅛ in. If it be a large bore clarionet, it would bear a little more; but it is not safe to go much beyond this, as if shortened too much it will throw the instrument out of tune, making the notes in the bottom register too flat and in the upper register too sharp. Instead of running the risk of spoiling his present socket, TOPPER would do well to buy from some musical instrument maker a "sharp" socket—that is, if his instrument is in the *English* pitch; for, as already stated, if it is in French pitch it cannot be brought up.—G.

Darkening Bronze.—J. E. (*Loughborough Junction*).—There are so many kinds of bronzes, each varying in colour and treatment so much, that, unless you give further particulars, it is difficult to advise you. Perhaps your panel is lacquered; and, if so, that would account for your not being able to darken it by exposure to the air.—R. A.

Soldering Lamp.—H. P. (*Shepherd's Bush*).—Consult the Indices to the two volumes of WORK already published, and search them through before asking queries, as the back numbers can always be had of Cassell & Co., London, E.C.—R. A.

Black for Lamp Stand.—BARRON.—Yes; you are quite right in supposing that Brunswick black is unsuitable for this purpose. You will find Berlin black very good for the job, because it dries with a nice, smooth, dead black; and if you brush it over when thoroughly dry with a rather soft brush, it takes a nice dull polish, if such a term can be applied to a dead black. Be sure to ask for Berlin black. It is sold at most ironmongers', 6d. and 1s. per bottle.—R. A.

Moderator Lamp.—A. L. (*London, S.E.*).—These lamps can be procured new at Gardner's, Charing Cross, or at Burton's (late Rippon & Burton), Oxford Street, and, in fact, at most high-class ironmongers'. But you would probably get one very cheaply by advertising for it in the "Exchange" column of WORK. Prices of new ones range from 12s. 6d. to 12 guineas. The quantity of oil per hour that a lamp of this kind would consume depends on the height it burns at and the size of the wick, but about 7½ hours to the pint is a fair average.—R. A.

Building and Accommodation.—A. C. (*Loveclough*).—I must take it for granted you wish the people to sit down. If this is so, you can easily get at the sitting accommodation of a floor space 40 ft. by 30 feet by taking the seat of an ordinary chair as being 1 ft. 6 in. by 1 ft. 6 in. Now allow 1 ft. 6 in. in front of the chair for the knees of the person sitting down, and this will just (and only just) allow of people passing in front without compelling the sitter to rise every time anyone passes in front of him or her, as the case may be. This gives us the exact space one person will occupy when sitting down—viz., 1 ft. 6 in. by 3 ft. 0 in., or 4 ft. 6 in. sup., occupied by one person. There are 1,200 ft. sup. in your room, so that as many 4 ft. 6 in. there are in 1,200 ft. will be the number of people the room will hold. You must make your own deductions for gangways, tables, or platform, seeing that you give me no particulars. You would find by setting the size of the room out to scale on a sheet of paper, and the size of one chair and the allotted space in front of chair out to the same scale on a piece of thin card, by cutting out the card and placing it on the paper, that you could move it about and at once see what you wanted.—E. D.

Fountains.—F. M. (*Manchester*).—I am not quite clear as to what you mean by "small illuminated fountains," or whether they are wanted for in- or out-door use. Write again.—C. M. W.

Paraffin Lamps.—ALADDIN.—Fig. 17, page 696, Vol. II., No. 95, is just the lamp you want, even to the silk fringe. The opal saucers used on the Argand gas lamps to soften the light will slide over the chimney of this lamp down to the level of the top of the wick. Some are large enough to go right down to the burner. If you want a fancy paper shade, you will have to make a wire support, of the kind used to support the common green card shades. That you could make yourself if you can solder. If you want it suspended at one fixed height, you have only to hook the three chains together at the top. I cannot tell you where you can get a lamp similar in design to the one you wish for, as, if I have correctly understood your requirement that the chains shall be easily detachable, you want the lamp to stand on the table on occasion; and I have never seen a lamp for sale similar to Fig. 17 on page 696, the chief recommendation of which is the possibility of using it as a hanging or standing lamp. If you are content to forego this advantage, and wish to buy one ready made, you can see a very good variety at Messrs. Benetfink's, 107 and 108, Cheapside, London, or you can write for their list.—THOMASO.

Obtaining a Patent.—DELTA.—The Patent Office rules state that—"On the acceptance of the complete specification, the comptroller shall advertise the acceptance; and the application and specification, or specifications, with the drawings (if any), shall be open to public inspection. Any person may, at any time within two months from the date of the advertisement of the acceptance of a complete specification, give notice at the Patent Office of opposition to the grant of the patent, on the ground of the applicant having obtained the invention from him, or from a person of whom he is the legal representative, or on the ground that the invention has been patented in this country on an application of prior date, or on the ground of an examiner having reported to the comptroller that the specification appears to him to comprise the same invention as is comprised in a specification bearing the same or a similar title, and accompanying a previous application; but on *no other ground*. If there is no opposition, or, in case of opposition, if the determination is in favour of the grant of a patent, the comptroller shall cause a patent to be sealed with the seal of the Patent Office." There are two modes of applying for the grant of a patent—one in which a provisional specification is lodged with the application, which, when accepted, is kept quite secret and never printed unless and until the patent is completed, and the complete specification filed. On the acceptance of this provisional specification, the applicant is at once protected, and has to complete his invention and

file his complete specification within nine months from the date of his application, on the acceptance of which, and after the expiry of the time granted for opposition, the patent will be sealed and issued. The other plan is by filing the complete specification and drawings *with* the application for the grant of a patent; but in this case the nine months' protection is lost, and nothing further in the way of improvement or addition which may be found desirable can be made to the patent, but another patent, embodying the additional improvements or knowledge, would have to be applied for, with the disadvantage that the acceptance of the documents by the office at once renders them accessible to the public, as has before been shown by the quotation from the rules. Both plans have their advantages; but great experience is required to know when and how to adopt each or either. The rules state that "A patent shall be sealed as soon as may be, and not after the expiration of fifteen months from the date of application, except in the cases hereinafter mentioned," which do not enter into the nature of our correspondent's inquiries.—C. E.

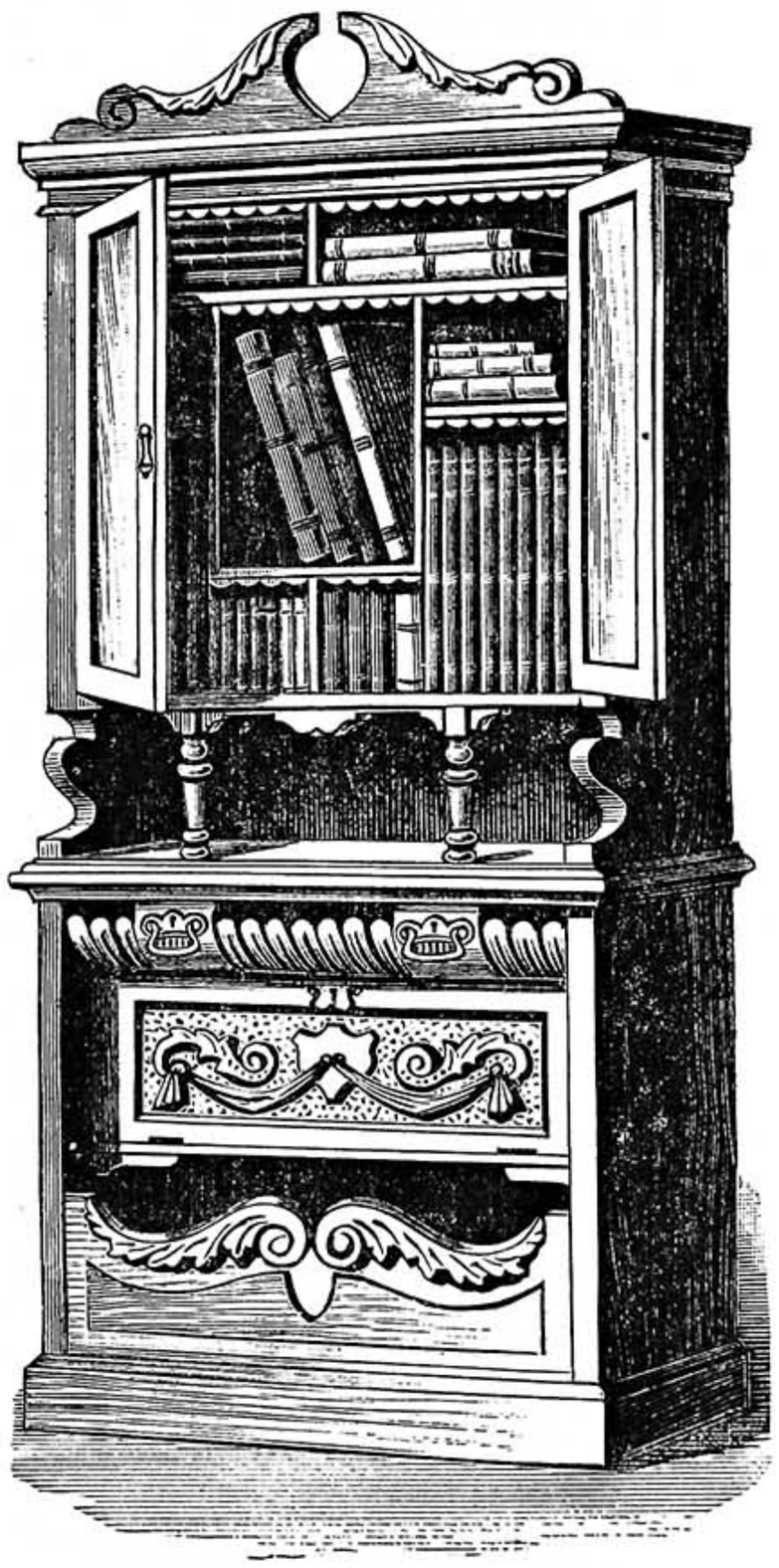
Schools of Electrical Engineering.—W. R. (*Carlisle*).—I have the opinion of a gentleman who is acquainted with the three schools mentioned. He places them in the following order of merit:—(1) City and Guilds of London Technical College, Leonard Street, Finsbury, London, E.C., with Professor Silvanus P. Thompson at the head of the Electrical Engineering Department; (2) School of Electrical Engineering, 12, Princes Street, Hanover Square, London, W., with Chas. Capito as senior instructor; (3) the Electrical Standardising, Testing, and Training Institution, Faraday House, Charing Cross Road, London, W.C., a new institution of great promise. Terms and a list of fees can be obtained by writing to the secretaries of these institutions. You will, perhaps, prefer a college nearer home. In that case, try University College, Liverpool, or Owens College, Manchester. As this profession is now in its youth, there are good prospects for a young man with an abundance of good health and plenty of "real grit" in his constitution.—G. E. B.

Advice to Young Workman.—DENNY.—My advice to you, and all like you, who have nearly learnt a trade, is to stick to the trade you have learnt until you can clearly see your way into another. You wish to be an electrical engineer. I sketched out for you the course I could recommend in my reply to you on p. 702, Vol. II. of WORK. I do not know of a firm that would take you as "improver," and pay you sufficient wages to maintain you. Electrical engineers want premiums with pupils. The galvanometer you propose would be almost useless to an electrical engineer, but might suit a telegraph or telephone linesman. Make the instrument as Mr. Allsop directs, but do not follow your own notions of improvement until you have made an instrument strictly on the lines of the directions given you by Mr. Allsop. He is a practical electrical engineer, one who has *worked* his way up in the profession. An electrical engineer must not only know all the theoretical rules of electrical engineering, but must also have put them into practice by years of hard work. Should you see a chance of getting into an engineering firm where they make electric apparatus, such as dynamos, etc., seize the opportunity, and put in your best work.—G. E. B.

Squeezing Wax for Carvers. — J. W. B. (*Huddersfield*).—There seems no reason why the squeezing wax made according to the recipe to which you refer should not remain in a usable condition "for years," but I have not tried its durability, so cannot say. From the ingredients, I should say that it can be softened at any time by heat. A wax that constantly remains soft and has no tendency to harden would be as defective as one which could only be used once because it gets hard. I should think you might build up plaster of Paris on wood, and then carve it; but I do not know that this method is much practised, if at all. Surely it would be better to cast in the plaster if you want more than one copy of the same pattern; or if only one is wanted, carve it in some suitable material.—D. A.

Etching Letters on Glass.—EMBOSSTYRO.—(1) In answer to your first question—"What acid is used in glass embossing?"—if you wish for clear letters, you must use hydrofluoric acid; but if you want a ground appearance the gas must be employed—made by mixing fluoride of calcium and sulphuric acid together, and afterwards heating; directions for which you will find in WORK, No. 82, p. 487, or I will repeat for your benefit if you have not got it. And by all means stop out with Brunswick black, if you like that best. (2) No colours are used. You cannot get coloured letters by this method; but white letters upon a coloured glass are very easily obtained by using flushed glass of any desired tint, and after stopping out, pouring the acid upon the flashed side; it soon eats through this, and leaves exposed the white glass underneath. I hardly think you know what glass embossing is, and, of course, I cannot tell how the glass you refer to is done, as I have never seen it. In embossing, or etching, as it is properly called, all the parts unprotected—*i.e.*, not stopped out—are eaten away by the acid, and if it was left on long enough it would go quite through the glass (therefore it can never be kept in glass bottles, but in something it will not touch: gutta-percha, for instance); and although, as you say in your letter, by it you can "put a name or inscription of any kind on a shop or other window or glass door," yet, as I have before explained, the letters or designs will be white. But if it is simply gilt letters you wish to put on glass, why go to the trouble of etching first? However, by this and other pieces upon the same subject, which you will, no doubt, have seen before this can appear, you will, I hope, have learnt what etching is, and if it is what you want, I have no doubt you will succeed, as it is not at all difficult; but if you know nothing of this acid, let me caution you to be very careful in using. It produces bad sores if dropped upon the flesh, and the gas is very injurious to breathe.—W. E. D., JR.

Bookcase. — WELL-WISHER.—I have designed the bookcase here shown, hoping that it may contain a suggestion or two of service to you. If the shaping and fitting of the shelves are not beyond your skill, I should advise you to scatter them in some such manner as that shown. The spaces would then be very convenient for the reception of your large volumes. You can either construct the top carcase to terminate in the brackets, or at the bottom of the latter join a moulded board, and



Bookcase.

screw the top carcase to the lower one. In the under carcase I have intended that the cupboard shall lay back a few inches, and have a flap door. In making the drawer, have a flat front joined perpendicularly to the sides, and glue and screw a curved-front plain or carved piece along it. I have introduced a shaped piece attached on the front of the job at the bottom, to hide any loose articles which might occasionally be thrown into the recess, whose appearance, perhaps, would not tend to enhance the good looks of a piece of furniture.—J. S.

Polishing.—X. L. U. M. (*Hebden Bridge*).—Either wax or oil polishing would suit your old cabinet. It could afterwards be French polished, but I should strongly recommend you not to have this done. French polish on such a piece of work would be quite out of place.—D. D.

Bending Fretwork.—E. C. (*Bristol*).—Does it not stand to reason that a piece of wood 12 in. long by 1¾ in. to 2⅛ in. wide cannot be "rounded to a 2 in. diameter circle," either by bending or otherwise? I am inclined to think you have misinterpreted the instructions or drawings to which you are working. I can only suggest that the mysterious circles should be either turned or sawn according to their size. I suppose these pieces form the "concave and convex sides" to which you refer.—D. D.

Wood-Carving Designs.—A. L. W. (*Aberystwith*).—You can obtain a list of printed designs and photographs by writing to the Manager, School of Wood Carving, Exhibition Road, South Kensington. Write also for a list of photographs of carvings to Bedford Lemere & Co., 147, Strand, London, W.C. Write also to Mr. G. A. Rogers, Maddox Street, London, W.—M. E. R.

Pedestal Dressing-Table.—YOUNG HAND.—The drawer runners of a pedestal dressing-table should be tongued (*i.e.*, the boards should be rebated on the top and bottom surfaces at the side ends, leaving projections from back to front), and fit into grooves on the inner surfaces of the sideboards. Plinths should be separately made, and screwed, from underneath, to boards which should be joined to the bottom of the sideboards. Either a whole board, framing, or beams, may be used within the four dovetailed boards of each plinth; the top surface of the former, in whichever case may be preferred, being a distance down from the top edges of the plinth boards equal to nearly a thickness of a drawer-runner. If you had referred to the articles I named in the reply to which you allude (page 325, No. 72, Vol. II.), you would have gained some insight concerning plinths. Look also to "A Writing Cupboard."—J. S.

Mounting Lenses.—LENSES.—There is no hard and fast rule for mounting, as this is determined by the lenses themselves. The best distance of the stops from the lens must be determined by actual experiment. Portrait and rectilinear lenses must almost invariably have the stops placed half-way between the two combinations as the most effective position; with landscape lenses a short distance in front. The nearer the stop is to the front of a landscape or single lens, the greater is the field covered, and also the greater the curvature of the lines. The farther away (of course in reason) the straighter the lines, but the smaller the field. In placing the stops, a compromise must be made to obtain as straight lines and cover as large an area as the lens is capable of. As to the sizes of the stops, no universal plan is adopted. The size of the openings is arbitrary. The Photographic Society of Great Britain introduced a uniform system based on 4 as the largest opening, each stop in succession smaller, requiring an exposure of double the time of the next largest. Very many lenses have their stops made in accordance with their focal length. The expressions F8, F16, F32 mean respectively that F8 is the diameter of the stop and one-eighth part of the focal length of the lens, measured from the back lens to the ground glass of the focussing screen; F16 means a sixteenth part of the focal length, and as the light diminishes according to the square of the distance, F16 would require four times as long exposure as F8, and so on with the other sizes.—D.

Bone Handles for Table-Knives.—F. G. H. (*Islington*). — The table cutlery trade is almost entirely confined to Sheffield, and unless F. G. H. can get what he wants through some friendly working cutler (*i.e.*, mender), we doubt whether he can do so except at that place. A Sheffield directory will give him the address of a dealer in such things. African ivory is used for all the best knives; the bone for the inferior ones is mainly imported from South America.—S. W.

Battery.—W. H. Y. (*Battersea*).—An article on the Austin Leclanché battery appeared in No. 84.

Incubator.—WHITE LEGHORN.—I gather that you have made a hot-air machine on Hillier's principle which answers well, but as you have not tried it you do not know whether it will succeed or not. If you will send me a rough sketch, with full particulars, I will give you my opinion of it. In my promised article you will have described a thoroughly reliable machine, which you can get ready in good time for next season's hatching.—LEGHORN.

Greenhouses.—C. S. (*London, N.W.*).—If you will examine the published Indexes to WORK, Vols. I. and II., you will find much already existing on greenhouses. WORK is issued both monthly and weekly. You are entitled to the presentation plate issued, gratis, with No. 105 of WORK.

Lithographic Stone Press.—G. A. (*Edinburgh*).—You should advertise your Quarter-sheet Litho. Press in WORK.

Fretwork Machine. — F. F. (*Leeds*).—If you wish to make a Fret machine, consult Indexes to Vols. I. and II. of WORK. There is a mass of matter in WORK relating to fret machines.

Price for Shed.—HEATHFIELDS.—You omit to say what the scantling of the oak posts are, also who is to make the shed and erect it; for if the carpenter frames and fits the various pieces together at his place, it must be taken to pieces before you can bring it away. You likewise make no mention of tie beams, or if the wood is to be wrought or not. I give below a fair price for the different sizes of stuff you mention, taking my own idea of the size of oak posts required. These prices are for stuff in the rough, not planed. This, I think, will be sufficient guide for your purpose.

6 in. by 6 in. oak posts, per foot run,			1s. to 1s. 3d.	About.
4 in. by 4½ in. yellow deal		„	2½d.	
3 in. by 4½ in.	„	„	2d.	
2 in. by 4 in.	„	„	2d.	

—E. D.

Contents of Saucepans. — HOLLOW-WARE.—To find the contents of the part outside the dotted lines, multiply the area of the space contained between the dotted line and the outside of the vessel by the circumference of a circle passing through the centre of gravity of that space. The area of the space referred to will be very nearly equal to the length of the dotted line (or height of

the vessel) multiplied by two-thirds of the breadth of space at centre. To find the centre of gravity of the area, draw it on fine card or stiff paper, cut it out, and hang it up freely on a pin by one end. On the same pin hang a plumb-line, and mark its position on the paper. Then in like manner hang the paper up on the pin by its other end, and where the plumb-line crosses the line drawn previously on the paper will be the centre of gravity. The distance of this point from the centre of the saucepan will be the radius of the required circle. If the vessel is in existence, you can get its contents by finding the weight of water it holds, taking the difference of its weight when full and when empty in pounds, and dividing by 62·37 to give the contents in cubic feet, or by 10 to give the contents in gallons. —F. C.

Electrotype Copies of Printer's Type.—COMPO.—The tools required will be: A moulding case—*i.e.*, a shallow brass pan to hold the cake of wax forming the mould—a clean copper or iron ladle to melt the wax in, a steam-jacketed pan for melting the wax and heating the moulding case, a set of "building irons," a shave knife, a press capable of taking forme, mould, and mould case, and a set of soft-haired brushes for the blackleading process. In addition to these, you will require a vat for the electrotyping solution, a battery of large cells, or a dynamo-electric machine to furnish current for the process, a backing tray, soldering tools, planing machine, and many other appliances found necessary in an electrotyper's workshop to finish the electro, and mount it ready for the printers. The materials required will be: Some best yellow beeswax for the moulds, sulphate of copper for the electrotyping solution, pure sheet copper for the anodes, best plumbago or blacklead for the mould, solder to "tint" the electro, stereotype metal to back it with, and wood blocks to mount the electros type high when finished. The type to be copied in this way must be specially set up for the purpose. The type should have a good bevel, as should also the rules and leads. All rules and leads should be thick. The quads, reglets, and spaces must be high, pages and blank spaces must be guarded, and the formes locked up tighter than for ordinary printing. The necessary quantity of beeswax should be melted by steam, and poured into the previously warmed moulding case from a clean ladle. The filled case must be kept level until the cake of wax is cool. The forme must be cleaned thoroughly, dried, and carefully blackleaded. Then the face of the type must be placed true with the face of the cake of wax in the moulding case, and the two pressed together in the press, so as to drive the wax of the mould into every crevice of the type. When this is done, and the forme removed, the mould must be well coated with dry, finely powdered plumbago, brushed well into every crevice with soft, long-haired brushes. The blackleaded surface is then connected to copper strips embedded in the mould, and placed in the electrotyping bath until it receives the necessary thickness of copper shell. This is removed from the mould, and placed face downwards in a backing tray floated on a bath of hot stereo metal, where it is first tinned with solder, then backed with a layer of stereo metal. The edges are then trimmed, and the electro mounted in the usual way on type-high blocks of wood. This is a brief outline of the method. For full and illustrated details of the process, get Mr. Watt's book on "Electro-Deposition," in which eighteen pages are devoted to the subject, and much other useful information given.—G. E. B.

Camera Bellows.—M. A. (*Maidenhead*).—The bellows can be purchased at most camera makers. Some firms make a speciality of supplying camera fittings of all kinds. No special tools are required in the process, which is exceedingly simple. H. Park, 5, Station Buildings, Acton Street, Kingsland Road, London, N., might supply your requirements.—D.

III.—QUESTIONS SUBMITTED TO CORRESPONDENTS.

Printers' Oil.—F. J. R. (*Burslem*) will be obliged for a good recipe for making printers' ink as used for ceramic work of copper plates.

Steel Lacquer.—J. B. (*Tyldesley*) writes:—"Will any reader tell me of a good steel lacquer, or give me the address of anyone who makes or sells it?"

Glossy Ticket Ink.—A. H. (*Oldham*) writes:—"Can any correspondent say where I can get glossy black ink for ticket writing ready for use?"

Artists' Easel.—S. A. W. (*Wallasey*) writes:—"Will any reader oblige me with full instructions of the working of, and how to make, a neat portable artists' easel?"

Cotton Belting.—S. A. & Co. (*Stockport*) write:—"Will any correspondent point out a good remedy to prevent injury to cotton belting where the friction is very great?"

Colouring Gun.—GUN writes:—"I have a gun, the barrel of which has been black, but has worn off. Can anyone tell me how I can black same? Also if I can 'blue' the bright parts without getting them hot, and how?"

Canoe.—J. G. (*Sunderland*) writes:—"Would any able reader give me the design of a canoe of simple make, with a few hints as to its construction?"

Turned Balusters.—F. E. H. (*Lancaster*) writes:—"I shall be glad to be informed of any turner who can supply me with these."

Rope Pulleys.—T. P. S. (*Tudhoe Grange*) writes:—"Will any reader give me a rule to work the proportions of rope pulleys that are used for winding engines at collieries? I want one to work with a working load of seven tons, including ropes, cages, and tubs. I cannot find one to suit."

Pyrotechny.—F. W. T. (*Heathfield*) writes:—"Will any reader kindly inform me where I can obtain the following works on Pyrotechny—a work by Practicus, a French work by Chertier, a volume by Brown, and one by Thomas Kentish?"

Index Rerum.—J. B. (*No Address*) would be glad to be informed how to set about making this article.

IV.—QUESTIONS ANSWERED BY CORRESPONDENTS.

Leclanché Battery.—M. (*Bishop Auckland*) writes, in reply to C. F. W. N. (*Forest Gate*) (see page 78, Vol. III.):—"You can procure Leclanché batteries from Mr. Bowron, electrician, 93, Praed Street, London, from 1s. and upwards."

Books on Coach Building.—COACH BUILDER writes, in answer to YOUNG WHEELER (see page 829, Vol. II.):—"There are the following works on coach building: Budd, "Carriage Suspension" (2s. 6d.); Philipson, "Coach Body Making" (4s. 6d.); Boag, "Coach Painting" (12s. 6d.); Mattison, "Coach Body Making explained Geometrically and Mechanically"—to be had of Thos. Mattison, carriage draughtsman, Southampton—(price 10s. 6d.); Foggert, "Carriage Springs" (2s. 6d.); Philipson, "Carriage Suspension" (4s. 6d.); Foggert, "Carriage Wheels" (2s. 6d.), "Carriage Timber" (2s. 6d.); Philipson, "Draught" (2s. 6d.), which can be had of John Kemp & Co., 46, Cannon Street, London."

Leclanché Battery.—THE ELECTRICAL COMPANY (*Crewkerne*) write, in reply to C. F. W. N. (*Forest Gate*) (see page 78, Vol. III.):—"Our prices for Leclanché batteries are: No. 1, 1s. 6d.; No. 2, 2s.; No. 3, 3s."

Lace Frame.—W. B. (*Camberwell*) writes, in answer to MART (see page 14, Vol. III.): "He must get a board 20 in. by 6 in., and ½ in. thick, across the ends of which then fasten a piece of wood 2 in. by 1 in. substance, 6 in. long, the 1 in. side to be fastened to the board. Along the tops of each end piece bore a row of holes—about twelve—to take small screws, to which the work is fastened."

Incubator Regulator.—H. H. S. writes, in reply to W. P. B. (*Colnbrook*) (see page 78, Vol. III.):—"The difficulty of making a regulator is not great, but when such regulators as Hearson's patent capsule can be obtained for 10s. 2d. or so, it seems hardly worth risking a break-down by making one. W. P. B. may make one of a U tube having one end closed, and putting a little ether at the closed end, and filling up with mercury, on which rests a float which is connected with the damper."

Turned Wood Cases.—F. C. (*Liverpool*) writes, in reply to W. H. (*Stirling*) (see page 14, Vol. III.): "P. Macmuldrow & Co., 168, London Road, Liverpool, make turned cases such as you require."

Joiners' Bits.—C. A. N. (*Wolverhampton*) writes, in answer to A. A. W. (*Leicester*) (see page 734, Vol. II.):—"I beg to say that he can inspect or purchase any of the bits used by joiners at any good tool shop, and also have them thoroughly explained. But I would like to call attention to an expanding centre-bit which was brought under my notice through your paper, and which is certainly the most clever and ingenious little tool I have bought for some time. They are made in three sizes, viz., $\frac{5}{16}$ in., $\frac{9}{16}$ in., and 1 in., and cut any hole up to double their size; so that with the three bits you can cut any sized hole, from $\frac{5}{64}$ in. up to 2 in., to a hair's-breadth. They are sold at 1s. 6d., 2s., and 3s. One very important thing about them is a small regulating screw at the side, which prevents the sliding cutter from expanding during the act of boring. I wrote direct to the inventor for mine after reading the article in your paper, WORK—a Mr. Anderson, 3, Poulton Road, Seacombe, Cheshire—and I consider them a valuable addition to my stock of joiners' bits."

V.—BRIEF ACKNOWLEDGMENTS.

Questions have been received from the following correspondents, and answers only await space in SHOP, upon which there is great pressure:—AMATEUR PRINTER; B. Co. (*Colchester*); G. W. V. (*Wolverhampton*); W. L. (*No Address*); F. H. (*Rochdale*); E. L. (*Bath*); G. T. (*Hollingwood*); J. F. (*Elgin*); J. F. (*Sandbach*); C. T. E. (*Somerset*); R. J. (*Leominster*); L. U. M. (*Hebden Bridge*); AN AMATEUR; J. C. (*Chelsea*); A. C. (*Leicester*); J. H. (*Wolverhampton*); G. P. (*Bebington*); A. H. (*Manchester*); BERTIE; G. H. (*Newcastle*); W. H. (*Penzance*); G. H. S. (*West Kensington*); G. W. W. (*Thornton Heath*); T. S. (*Morpeth*); W. J. B. (*Deptford*); E. H. (*Sunderland*); R. W. V. (*Camberwell*); M. H. M. (*Hull*); H. H. L. (*Bebington*); J. R. (*Kilmallock*); BRASS (*Glasgow*); H. R.; P. O. C. (*Cork*); A. G. (*Sheffield*); J. J. (*Kidderminster*); G. H. S. (*London, W.*); A. H. (*Manchester*); GALVANIC; APEX; J. A. M. (*London, N.W.*); PARALLAX; J. M. (*Kilmarnock*); R. J. (*Sheffield*); T. E. (*Wandsworth*); F. D. (*Margate*); A. K. (*Bristol*); M. W. (*Bath*); F. G. I. (*Dundee*); G. F. (*Paisley*); F. Y. (*Sunderland*); B. C. (*Oldham*); W. E. G. (*Preston*); V. D. (*Hereford*); G. M. (*Hull*); L. A. (*New York*); S. W. (*Watford*); E. P. (*Hampstead*); T. K. (*Windsor*); G. L. (*Reading*) J. H. (*Brighton*); C. P. (*London*); A. S. (*Yarmouth*); A. L. C. (*Richmond*); E. J. P. (*Belfast*); R. B. (*Chiswick*); T. G. (*Liverpool*); B. E. (*Newcastle*); F. L. (*Edinburgh*); A. L. (*Manchester*); S. K. (*Birmingham*); T. W. S. (*Glasgow*); R. B. (*Birmingham*); A. E. B. I. P. (*Cheshire*); W. W. (*Fulham, S.W.*); R. T. (*Paisley*); W. M. L. (*London*); A. B. (*Nottingham*); J. B. (*Devonport*); J. M. (*Fulham, S.W.*); F. S. (*Bristol*); W. B. P.; A REGULAR SUBSCRIBER; VERAX; MUSICUS.

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